ɹrking File Folder - NSR Permit

npany Name: Burlington Resources Oil + Gas Company LP

ınty: Live Oak

:ount: n/a

: 10645681 7

Permit No: 104140

Filing Date: 12/13/12

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104140

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PERMITS

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TCEQ CFR

EFSCOP00005458

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 13, 2012

MR RANDY BLACK
MANAGER OF PRODUCTION OPERATIONS - GCBU
BURLINGTON RESOURCES OIL AND GAS COMPANY LP
600 N DAIRY ASHFORD WESTLAKE 3 STE 15012
HOUSTON TX 77079-

Permit by Rule Registration Number:	104140
Location/City/County:	From the intx of US 281 and FM 99 head NE on FM 99 for 4.9 mi turn L to stay on FM 99 and head N for 2.8 mi turn R onto CR 271 and head E 1.66 mi enter lease rd on R and turn L continue 1.2 mi turn R for 1.5 mi site at end of lease rd, Whitsett, Live Oak County
Project Description/Unit:	Jo Ann Esse Unit F1
Regulated Entity Number:	RN106456817
Customer Reference Number:	CN602989436
New or Existing Site:	New

Burlington Resources Oil & Gas Company LP has certified the emissions associated with the Jo Ann Esse Unit F1 under Title 30 Texas Administrative Code §§ 106.352 (l)(effective 2/27/2011), 106.492 (effective 9/4/2000). The TCEQ Air Permits Division recommends that Burlington perform site-specific analysis including H2S concentration and recalculate emissions (if needed) to confirm that site-wide emissions do not exceed the certified limits, within six months from start of operation or from the date this letter is issued whichever is later. Emissions are listed on the attached table. For rule information see www.tceq.texas.gov/permitting/air/nav/standard.html.

Planned MSS emissions for flare downtime and downstream compressor maintenance have been reviewed. These authorized MSS emissions are included on the emissions table. No other planned MSS emissions have been represented or reviewed. The company is also reminded that these facilities may be subject to and must comply with other state and federal air quality requirements. In addition, under the General Requirements for all Permit by Rules, § 106.2 states that particular requirements only apply "where construction is commenced on or after the effective date of the relevant permit by rule."

This certification is taken under the authority delegated by the Executive Director of the TCEQ. If you have questions, please contact Ms. Dana Johnson at (512) 239-2022.

Sincerely,

Anne M. Inman, P.E., Manager
Rule Registrations Section
Air Permits Division

cc: Air Section Manager, Region 14 - Corpus Christi

Project Number: 179758

Emission Sources - Certified Emission Rates

Registration Number 104140

This table lists the certified emission rates and all sources of air contaminants on the applicant's property covered by this registration. The emission rates shown are those derived from information submitted as part of the registration for PBR.

ESTIMATED EMISSIONS														
EPN / Emission Source	**VOC**		**NO_x**		**CO**		**$PM_{10\&2.5}$**		**SO_2**		**HCHO**		**H_2S**	
	lbs/hr	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**
Normal Operations														
FUG / Site Fugitives	0.40	1.74											<0.01	<0.01
TK-01 - 03 / Condensate Tanks	2.62	4.24											<0.01	<0.01
TK-04 / Produced Water Tank	0.02	0.02											<0.01	<0.01
TRUCK1 / Condensate Truck Loading	1.58	0.58												
TRUCK2 / Produced Water Truck Loading	0.02	<0.01												
FL-1 / Flare	0.03	0.06	1.08	2.07	2.15	4.16	<0.01	<0.01	0.06	0.25			<0.01	<0.01
Scheduled Maintenance, Startup and Shutdown Event														
SEP-GAS / Low Pressure Separator Gas to Flare	23.38	6.14											0.03	0.01
FL-1 / Flare Combustion (LP separator waste gas)	0.34	0.09	11.46	3.01	22.89	6.01	<0.01	<0.01	2.71	0.90			0.03	0.01
TK-01 - 03 / Condensate Tank Standing Loss (during flare downtime)	1.73	0.15												
TK-04 / Produced Water Tank Standing Loss (during flare downtime)	<0.01	<0.01												
TOTAL EMISSIONS (TPY):		**13.02**		**5.08**		**10.17**		**<0.01**		**1.15**				**0.02**
MAXIMUM OPERATING SCHEDULE:	**Hours/Day**				**Days/Week**			**Weeks/Year**			**Hours/Year**		8,760	

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	104140	***Company Name:***	Burlington Resources Oil & Gas Company LP	***APD Reviewer:***	Ms. Dana Johnson
Project No.:	179758	***Unit Name:***	Jo Ann Esse Unit F1	***PBR No(s).:***	106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)

GENERAL INFORMATION			
Regulated Entity No.:	RN106456817	**Project Type:**	Permit by Rule Application
Customer Reference No.:	CN602989436	**Date Received by TCEQ:**	July 6, 2012
Account No.:	None assigned	**Date Received by Reviewer:**	November 29, 2012
City/County:	Whitsett, Live Oak County	**Physical Location:**	From the intx of US 281 and FM 99 head NE on FM 99 for 4.9 mi turn L to stay on FM 99 and head N for 2.8 mi turn R onto CR 271 and head E 1.66 mi enter lease rd on R and turn L continue 1.2 mi turn R for 1.5 mi site at end of lease rd

CONTACT INFORMATION					
Responsible Official/ Primary Contact Name and Title:	Mr. Randy Black Manager Of Production Operations - GCBU	**Phone No.:** **Fax No.:**	(832) 486-6508 (832) 486-6431	**Email:**	RANDY.C.BLACK@CONOCOPHILLIPS.COM
Technical Contact/ Consultant Name and Title:	Mr. James Woodall Sr. Environmental Specialist	**Phone No.:** **Fax No.:**	(832) 486-6508 (832) 486-6431	**Email:**	JAMES.WOODALL@CONOCOPHILLIPS.COM

GENERAL RULES CHECK	YES	NO	COMMENTS
Is confidential information included in the application?		X	
Are there affected NSR or Title V permits for the project?		X	
Is each PBR > 25/250 tpy?		X	
Are PBR sitewide emissions > 25/250 tpy?		X	
Are there permit limits on using PBRs at the site?		X	
Is PSD or Nonattainment netting required?		X	
Do NSPS, NESHAP, or MACT standards apply to this registration?		X	
Does NOx Cap and Trade apply to this registration?		X	
Is the facility in compliance with all other applicable rules and regulations?	X		
Is Registration Certified?	X		
Does the site handle sour oil or gas?	X		Distance to receptor if Sour: > 4,700 feet
Did the company use a Simulator program (such as ProMax?)	X		
Is planned MSS included in the registration?		X	

DESCRIBE OVERALL PROCESS AT THE SITE
This Permit by Rule (PBR) registration is being submitted to authorize three (3) condensate storage tanks and associated loading, one (1) produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. Figure 1-1 is an area map showing the location of the Site and the surrounding area. Figure 1-2 is a process flow diagram for the Site.

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	104140	***Company Name:***	Burlington Resources Oil & Gas Company LP	***APD Reviewer:***	Ms. Dana Johnson		
Project No.:	179758	***Unit Name:***	Jo Ann Esse Unit F1	***PBR No(s).:***	106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)		

DESCRIBE PROJECT AND INVOLVED PROCESS

Normal Operations

The Site has a single well which will produce high pressure gas and liquids (condensate and water). The mixture extracted from the well will first pass through a high pressure separator where the high pressure gas will be collected and sent to pipeline. Liquids from the HP separator will then pass to a low pressure separator. Low pressure gas off of the LP separator will go to sales as well, via a low pressure pipeline.

Pressurized liquids from the low pressure separator will be divided into both produced water and condensate streams. Condensate is routed to the condensate storage tanks (FINs [Facility Identification Number] TK-01, TK-02 and TK-03) and water is routed to the produced water tank (FIN TK-04). The emissions associated with the flash from the pressure change as well as the working/breathing emissions from all tanks are routed to a flare (FIN FL-1) and are captured and controlled at a 98% efficiency. As demonstrated in the calculations, assist gas is sent to the flare to ensure that the waste gas stream can sustain combustion.

The condensate and produced water tanks are loaded out periodically (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the flare (FIN FL-1). The Site will also emit emissions due to equipment component leaks (FIN FUG).

Scheduled Maintenance Startup and Shutdown Events

In accordance with TCEQ guidance and 30 Texas Administrative Code (TAC) §106.352, a representation of planned Maintenance, Startup and Shutdown events are included in this PBR registration in addition to the normal operating scenario.

It is conservatively planned that the flare will be down for maintenance 2% of the year. During this time the well would be shut in and therefore gas and liquids would not be producing, but any liquids previously in storage tanks (FINs TK-01, TK-02, TK-03, and TK-04) would have standing losses emitted to atmosphere.

Additionally, during engine maintenance events at downstream sites the low pressure separator gas (FIN SEP-GAS) is sent to the flare (FIN FL-1) for combustion. This scenario is conservatively predicted to occur 6% of the year.

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	104140	***Company Name:***	Burlington Resources Oil & Gas Company LP	***APD Reviewer:***	Ms. Dana Johnson
Project No.:	179758	***Unit Name:***	Jo Ann Esse Unit F1	***PBR No(s).:***	106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)

ESTIMATED EMISSIONS														
EPN / Emission Source	**VOC**		**NO_x**		**CO**		**$PM_{10\&2.5}$**		**SO_2**		**HCHO**		**H_2S**	
	lbs/hr	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**	**lbs/hr**	**tpy**
Normal Operations														
FUG / Site Fugitives	0.40	1.74											<0.01	<0.01
TK-01 - 03 / Condensate Tanks	2.62	4.24											<0.01	<0.01
TK-04 / Produced Water Tank	0.02	0.02											<0.01	<0.01
TRUCK1 / Condensate Truck Loading	1.58	0.58												
TRUCK2 / Produced Water Truck Loading	0.02	<0.01												
FL-1 / Flare	0.03	0.06	1.08	2.07	2.15	4.16	<0.01	<0.01	0.06	0.25			<0.01	<0.01
Scheduled Maintenance, Startup and Shutdown Event														
SEP-GAS / Low Pressure Separator Gas to Flare	23.38	6.14											0.03	0.01
FL-1 / Flare Combustion (LP separator waste gas)	0.34	0.09	11.46	3.01	22.89	6.01	<0.01	<0.01	2.71	0.90			0.03	0.01
TK-01 - 03 / Condensate Tank Standing Loss (during flare downtime)	1.73	0.15												
TK-04 / Produced Water Tank Standing Loss (during flare downtime)	<0.01	<0.01												
TOTAL EMISSIONS (TPY):		**13.02**		**5.08**		**10.17**		**<0.01**		**1.15**				**0.02**
MAXIMUM OPERATING SCHEDULE:	**Hours/Day**				**Days/Week**			**Weeks/Year**			**Hours/Year**		8,760	

	TECHNICAL REVIEWER	**PEER REVIEWER**	**FINAL REVIEWER**
SIGNATURE:			See Hard Copy.
PRINTED NAME:	Ms. Sally Bittick	Mr. Vincent Rehkopf	Ms. Anne M. Inman, P.E., Manager
DATE:	December 13, 2012	December 13, 2012	December 13, 2012

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RR Section Tracking/Route Sheet							
Company Name:	**Burlington Resources Oil & Gas Co.**			**Q2 Date: November 28, 2012**			
Permit No.: 104140				**Project No.: 179758**			
Station #	**Action/Task Description**	**RVR**	**Peer**	**Station #**	**Action/Task Description**	**RVR**	**Peer**
	Application Scanned						
0	file saved in J:\				Update TRV	SB	
					complete Emissions table from file info		
	Authorization Letter merged	SB		4	Add reviewer name to TRV		
	confirm Proj Name, Permit #				Remove all highlights & notes from TRV		
	clean-up location directions				file saved in J:\		
	confirm if MSS associated						
	file saved in J:\				Proofing	SB	VR
1	Technical Summary Review merged				TRV - Confirm all text in TRV readable		
	confirm Proj Name, Permit #				check name, #, site, proj descr		
	confirm contact info			5	Sign peer reviewer on TRV		
	determine if sweet/sour + dist				Letter - Confirm all text in TRV readable		
	determine federal applicability				check name, #, site, proj descr		
	file saved in J:\				Final Package		
	Update TRV from pdf file				IMS update tracking elements		
2	Site/Plant description				check name, #, site, proj descr		
	Project description			6	update attributes		
					Print Mikey (2 copies)		
	file saved in J:\				Print Letter (2 copies)	VR	
	Technical Review				Print TRV (2 copies)		
	confirm unit description to calc inputs						
	Storage tanks			7	To Anne for signature	VR	
	Truck Loading						
	Engines				TRV profiled		
	Flares or Combustor			8	LTR profiled		
	Other units:				Application profiled		
3	compare calculation results to emissions summary						
	fugitives			**Page No.**	**Issue**		
	Storage tanks						
	Truck Loading						
	Engines						
	Flares or Combustor						
	Other units:						

07/09/2012 --------------NSR IMS - PROJECT RECORD ---

PROJECT#: 179758 PERMIT#: 104140 STATUS: PENDING DISP CODE: ___________
RECEIVED: 07/06/2012 PROJTYPE: INITIAL AUTHTYPE: PBR ISSUED DT: ___________
RENEWAL:
PROJECT ADMIN NAME: JO ANN ESSE UNIT F1
PROJECT TECH NAME: JO ANN ESSE UNIT F1

P77 Cert
4,700 feet
H2S 200 ppm

Assigned Team: RULE REG SECTION

STAFF ASSIGNED TO PROJECT:

YOUNG , SANDRA	- REVIEWR1_2 -	AP INITIAL REVIEW
TEAM LEADER , RR	- REVIEW ENG -	RULE REG SECTION

CUSTOMER INFORMATION (OWNER/OPERATOR DATA)
ISSUED TO: BURLINGTON RESOURCES OIL & GAS COMPANY LP
COMPANY NAME: Burlington Resources Oil & Gas Company LP
CUSTOMER REFERENCE NUMBER: **CN602989436**

REGULATED ENTITY/SITE INFORMATION
REGULATED ENTITY NUMBER: **RN106456817** ACCOUNT:
PERMIT NAME: JO ANN ESSE UNIT F1

REGULATED ENTITY LOCATION: FROM THE INTX OF US 281 AND FM 99 HEAD NE ON FM 99 FOR 4.9 MI TURN L TO STAY ON FM 99 AND HEAD N FOR 2.8 MI TURN R ONTO CR 271 AND HEAD E 1.66 MI ENTER LEASE RD ON R AND TURN L CONTINUE 1.2 MI AND TURN R FOR 1.5 MI SITE AT END OF LEASE RD
REGION 14 - CORPUS CHRISTI NEAR CITY: WHITSETT COUNTY: LIVE OAK

CONTACT DATA

CONTACT NAME: MR RANDY BLACK CONTACT ROLE: RESPONSIBLE OFFICIAL

JOB TITLE: MANAGER OF PRODUCTION OPERATIONS - GCBU ORGANIZATION: BURLINGTON RESOURCES OIL AND GAS COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD WESTLAKE 3 STE 15012 , HOUSTON, TX, 77079-
PHONE: (832) 486-6508 Ext: 0
FAX: (832) 486-6431 Ext: 0
EMAIL:RANDY.C.BLACK@CONOCOPHILLIPS.COM

CONTACT NAME: MR JAMES WOODALL CONTACT ROLE: TECHNICAL CONTACT

JOB TITLE: SR ENVIRONMENTAL SPECIALIST ORGANIZATION: BURLINGTON RESOURCES OIL & GAS COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD WESTLAKE 3 STE 15012 , HOUSTON, TX, 77079-

PHONE: (832) 486-6508 Ext: 0
FAX: (832) 486-6431 Ext: 0
EMAIL:JAMES.WOODALL@CONOCOPHILLIPS.COM

FEE:

Reference	Fee Receipt Number	Amount	Fee Receipt Date	Fee Payment Type
24853		450.00		CHECK

TRACKING ELEMENTS:

TE Name	Start Date	Complete Date
APIRT RECEIVED PROJECT (DATE)	07/06/2012	
CENTRAL REGISTRY UPDATED	07/06/2012	07/09/2012
APIRT TRANSFERRED PROJECT TO TECHNICAL STAFF (DATE)	07/09/2012	
DEFICIENCY CYCLE		
ENGINEER INITIAL REVIEW COMPLETED (DATE)		
PEER / MANAGER REVIEW PERIOD		
PROJECT RECEIVED BY ENGINEER (DATE)		

PROJECT RULES:

Unit Desc	Rule Desc	Request Type	On Application	Approve
OIL AND GAS PRODUCTION FACILITIES	106.352 2011-FEB-27 -	ADD	Y	APPROVE
FLARES	106.492 -	ADD	Y	APPROVE

PERMIT RULES:

Unit Desc	Rule Desc	Start Date	End Date

PROJECT ATTRIBUTES:

Attributes	Value
PROJECT POINT	

ATTACHMENT 3
EMISSION RATE CALCULATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT F1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

			Proposed Allowable Hourly and Annual Emission Rates											
			CO		NO_X		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC		H_2S	
EPN	**FIN**	**Description**	**(lb/hr)**	**(T/yr)**	**(lb/hr)**	**(T/yr)**	**(lb/hr)**	**(T/yr)**	**(lb/hr)**	**(T/yr)**	**(lb/hr)**	**(T/yr)**	**(lb/hr)**	**(T/yr)**
Normal Operations														
FUG	FUG	Site Fugitives	--	--	--	--	--	--	--	--	0.40	1.74	0.0002	0.001
FL-1	TK-01 TK-02 TK-03	Controlled Condensate Tank Emissions	--	--	--	--	--	--	--	--	2.62	4.24	0.0002	0.001
FL-1	TK-04	Controlled PW Tank Emissions	--	--	--	--	--	--	--	--	0.02	0.02	0.000002	0.00001
FL-1	TRUCK1	Controlled Condensate Truck Loading	--	--	--	--	--	--	--	--	1.58	0.58	--	--
FL-1	TRUCK2	Controlled Produced Water Truck Loading	--	--	--	--	--	--	--	--	0.02	0.0003	--	--
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist, and pilot)	2.15	4.16	1.08	2.07	--	--	0.06	0.25	0.03	0.06	0.0004	0.002
Scheduled Maintenance, Startup and Shutdown Events														
FL-1	SEP-GAS	Low Pressure Separator Gas to Flare	--	--	--	--	--	--	--	--	23.38	6.14	0.03	0.01
FL-1	FL-1	Flare Combustion (lp separator waste gas)	22.89	6.01	11.46	3.01	--	--	2.71	0.90	0.34	0.09	0.03	0.01
TK-01 TK-02 TK-03	TK-01 TK-02 TK-03	Uncontrolled Condensate Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	1.73	0.15	--	--
TK-04	TK-04	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	0.001	0.0001	--	--
		Site-Wide Emissions:	**--**	**10.17**	**--**	**5.08**	**--**	**0.00**	**--**	**1.15**	**--**	**13.02**	**--**	**0.02**

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Component	Number of Components	Emission Factors [a] (lb/hr-component)	Annual Operating Hours (hr/yr)	Maximum VOC[a] (wt%)	Maximum H_2S (wt%)	Reduction Credit [a] (%)	PTE VOC Hourly [b] (lb/hr)	PTE VOC Annual [c] (T/yr)	PTE H_2S Hourly [b] (lb/hr)	PTE H_2S Annual [c] (T/yr)
Valves										
Gas Streams	48	0.00992	8,760	30%	0.04%	0%	0.14	0.63	0.0002	0.001
Light Oil	29	0.0055	8,760	100%	--	0%	0.16	0.70	--	--
Water/Light Oil	45	0.000216	8,760	--	--	0%	0.01	0.04	--	--
Pumps										
Water/Light Oil	1	0.000052	8,760	--	--	0%	0.0001	0.0002	--	--
Flanges										
Gas Streams	70	0.00086	8,760	30%	0.04%	0%	0.02	0.08	0.00002	0.0001
Light Oil	26	0.000243	8,760	100%	--	0%	0.01	0.03	--	--
Water/Light Oil	8	0.000006	8,760	--	--	0%	0.00005	0.0002	--	--
Connectors										
Gas Streams	75	0.00044	8,760	30%	0.04%	0%	0.01	0.04	0.00001	0.0001
Light Oil	60	0.000463	8,760	100%	--	0%	0.03	0.12	--	--
Water/Light Oil	90	0.000243	8,760	--	--	0%	0.02	0.10	--	--
						TOTAL:	**0.40**	**1.74**	**0.0002**	**0.001**

[a] Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

[b] Hourly VOC emission rates are calculated as follows:
(48 components) * (0.00992 lb/hr-component) * (30% VOC) * (100% - 0% reduction credit) = 0.14 lb/hr

[c] Annual VOC emission rates are calculated as follows:
(48 components) * (0.00992 lb/hr-component) * (8,760 hr/yr) * (30% VOC) * (100% - 0% reduction credit) / (2,000 lb/T) = 0.63 T/yr

SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

			VOC Emissions								H_2S Emissions[c]			
			Flash Emissions[a]		Working Breathing Emissions[b]		Uncontrolled Total		Controlled Total[d]		Uncontrolled Total		Controlled Total[d]	
EPN	**FIN**	**Description**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**
FL-1	TK-01 TK-02 TK-03	500 bbl Condensate Storage Tanks	44.56	195.17	86.19	16.75	130.75	211.92	2.62	4.24	0.01	0.04	0.0002	0.001
FL-1	TK-04	500 bbl Produced Water Storage Tank	0.22	0.96	0.76	0.01	0.98	0.97	0.02	0.02	0.0001	0.0004	0.000002	0.00001

Notes:

[a] VOC Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

[b] The Working/Breathing emissions are calculated using AP 4.2 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

[c] The Ideal Gas Law was used to estimate the H2S emission rates using the maximum sulfur concentration in the gas coming off the tanks (200 ppm). An example calculation for hourly H2S emissions from FIN TK-04 follows:

H_2S (lb/hr) = (% Vol H_2S in stream) * (Total Volumetric Flow of Gas, scf/hr) * (1 atm STP) * (34.0798 lb/lb-mol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = (200 ppm /10^6) * (3.95 scf/hr) * (1 atm) * (34.0789 lb/lbmol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = 0.0001 lb/hr

[d] All VOC tank emissions are routed to the flare control device with a capture and control efficiency of 98%. H_2S emissions are captured at 98% and then 98% converted to SO_2 during combustion.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	tatal loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	40
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications																VOC	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q^2		ΔTv	Hvo	Vv	T_{LA}	P_{VA}	Wv	ΔPv	Ke	Ks	Kn	L_S	L_W	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Thruput (bbl/hr)	Annual thruput (bbl)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Vapor Space Volume (ft3)	Daily Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expan. Factor	Vented Vapor Sat. Factor	Turnover Factor	Standing Loss per tank (lb/yr)	Working Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	3	V	12	25	500	Gray	Good	0.54	40	11.05	195	146,000	36.75	12.63	1428.4	539.8	11.649	0.08044	3.18790	1.0933	0.11	0.27	15,131.22	18,368.14	**86.19**	**16.75**
PW	1	V	12	25	500	Gray	Good	0.54	35	0.111	195	9,125	36.75	12.63	1428.4	539.8	0.032	0.00019	0.02005	0.0662	0.98	1.00	6	10.22	**0.76**	**0.01**

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chspter 7 or are default unit values.

CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Sample Calculations for condensate:

Loading Loss (lb/Mgal) = 12.46 * S * P * M / T (AP-42 Section 5.2)
Maximum Loading Loss = 12.46 * 0.60 * 11.050 * 40 / 560 = 5.900 lb/Mgal

Hourly Uncollected Emissions PTE = (Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (1 - Capture Efficiency)
Hourly Uncollected Emissions PTE = (8.19 Mgal/hr) * (5.900 lb/Mgal) * (1 - 0.987) = 0.63 lb/hr

Hourly PTE = ((Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (Capture Efficiency) * (1 - Control Efficiency)) + (Hourly Uncollected Loading Emissions, (lb/hr))
Hourly PTE = (8.19 Mgal/hr) * (5.900 lb/Mgal) * (0.987) * (1 - 0.98) + (0.63 lb/hr) = 1.58 lb/hr

Annual Emissions = ((Annual Throughput, Mgal/yr) * (Average Loading Loss, lb/Mgal) * (Capture Efficiency) * (1 - Control Efficiency)) + (Annual Uncollected Loading Emissions, lb/yr)) / (2000 lb/T)
Annual Emissions = (6132.00 Mgal/yr) * (5.800 lb/Mgal) * (0.987) * (1 - 0.98) + (462.35 lb/yr) / (2000 lb/T) = 0.58 T/yr

FIN	EPN	Facility Name	S	P @ 560 °R (psia)	P @531.7 °R (psia)	M	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgals/yr)	Capture Efficiency	Hourly Uncollected Loading Emissions (lb/hr)	Annual Uncollected Loading Emissions (lb/yr))	Control Efficiency	Hourly PTE (lb/hr)	Annual PTE (T/yr)
TRUCK1	FL-1	Condensate Truck Loading	0.60	11.05	10.306	40	5.90	5.80	8.19	6,132.00	0.987	0.63	462.35	0.98	1.58	0.58
TRUCK2	FL-1	Produced Water Truck Loading	0.60	0.11	0.024	35	0.05	0.05	8.19	383.25	0.987	0.01	0.25	0.98	0.02	0.0003

Daily maximum and daily minimum ambient temperature from Tanks 4.09d for this area's annual averages (81.6 and 62.5, for average of 72.1).

Annual Average Condensate Vapor Pressure at T_{LA} :
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(11.05) - 7261/(72.1+459.6) + 12.82}
10.306 psia

Annual Average Produced Water Vapor Pressure at T_{LA} :
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(11.05*.01) - 7261/(72.1+459.6) + 12.82}
0.024 psia

SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND WASTE GAS COMBUSTION POTENTIAL TO EMIT- NORMAL OPERATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	CO		NO_X		SO_2		H_2S		VOC	
			(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.04	0.003	0.01	0.001	0.002	0.0000002	0.000001	0.0001	0.0004
FL-1	FL-1	Flare Assist Gas Combustion	0.44	1.93	0.22	0.96	0.04	0.18	0.00001	0.00004	0.01	0.04
FL-1	FL-1	Waste Gas Combustion	1.70	2.19	0.86	1.10	0.02	0.07	0.0004	0.002	0.02	0.02
		Totals:	**2.15**	**4.16**	**1.08**	**2.07**	**0.06**	**0.25**	**0.0004**	**0.002**	**0.03**	**0.06**

CALCULATION OF FLARE PILOT GAS and FLARE ASSIST GAS POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV (Btu/scf)	Heat Release scf/hr	Operating Hours (hr/yr)	Pollutant	Emission Factors	Units	Emission Rates Hourly[a] (lb/hr)	Emission Rates Annual[b] (T/yr)
FL-1	FL-1	Flare 1- Process Pilot Combustion	1,292	15	8,760	CO	0.2755	lb/MMBtu	0.01	0.04
						NO_X	0.138	lb/MMBtu	0.003	0.01
						$PM/PM_{10}/PM_{2.5}$	--[c]	--	--	--
						SO_2	200	ppm H_2S	0.0005	0.002
						H_2S	200	ppm H_2S	0.0000002	0.000001
						VOC	5.5	lb/MMscf	0.0001	0.0004
FL-1	FL-1	Flare 1- Process Flare Assist Gas Combustion	1,292	1,250	8,760	CO	0.2755	lb/MMBtu	0.44	1.93
						NO_X	0.138	lb/MMBtu	0.22	0.96
						$PM/PM_{10}/PM_{2.5}$	--[c]	--	--	--
						SO_2	200	ppm H_2S	0.04	0.18
						H_2S	200	ppm H_2S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04

[a] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows:

CO (lb/hr) = (Heat Release, scf/hr) * (Lower Heating Value, Btu/scf) * (MM/10^6)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (15 scf/hr) * (1,292 Btu/scf) * (MM/10^6)*(0.2755 lb/MMBtu)

= | 0.01 lb/hr CO |

The Emission Factors for SO_2 and VOC were based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Heat Release, scf/hr) * (MM/10^6) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (15 scf/hr) * (MM/10^6) * (5.5 lb/MMscf)

= | 0.0001 lb/hr VOC |

A material balance approach was used to estimate the SO_2 and H_2S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 5-1, H_2S concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SO_2, and 2% will remain uncombusted and unconverted. An example calculation for hourly SO_2 emissions for the pilot gas of EPN FL-01 follows:

SO_2 (lb/hr) = Heat Release (scf/hr)*(Sulfur Content, ppmv)*(98% conversion to SO_2)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SO_2/34.065 lb H2S)

SO_2 (lb/hr) = (15 scf/hr)*(200 ppm H2S)/10^6 scf gas)*(1 lb-mol/379 scf)*(98% converted to SO2)*(34.065 lb H2S/lb-mol)*(64.06 lb SO2/34.065 lb H2S)

= | 0.0005 lb/hr SO_2 |

[b] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Hourly Emissions, lh/hr)*(Annual Operating Hours, hr/yr)*(1 T/2,000 lb)

CO (T/yr) = (0.01 lb/hr)*(8,760 hr/yr)*(1 T/2,000 lb)

CO (T/yr) = | 0.04 T/yr CO |

[c] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT F1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV[a] (Btu/scf)	Waste Gas Flow Rate Hourly (MMBtu/hr)	Waste Gas Flow Rate Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Potential to Emit Hourly[b] (lb/hr)	Potential to Emit Annual[c] (T/yr)
FL-1	FL-1	Process Flare	2,088	6.13	15,800.24	CO	0.2755	lb/MMBtu	1.69	2.18
		Condensate Tanks and Loading				NO_X	0.1380	lb/MMBtu	0.85	1.09
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	0.02	0.07
						H_2S	--[c]	--	0.0002	0.001
						VOC	5.5	lb/MMscf	0.02	0.02
FL-1	FL-1	Process Flare	1,779	0.05	67.11	CO	0.2755	lb/MMBtu	0.01	0.01
		Produced Water Tank and Loading				NO_X	0.1380	lb/MMBtu	0.01	0.005
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	0.0002	0.001
						H_2S	--[c]	--	0.0002	0.001
						VOC	5.5	lb/MMscf	0.0002	0.0001

[a] Waste gas stream lower heating value was taken from WinSim calculated stream value.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN Fl-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)
CO (lb/hr) = (6.13 MMBtu/hr)*(0.2755 lb/MMBtu)
= 1.69 lb/hr CO

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr) / (Lower Heating Value, Btu/scf) * (Emission Factor, lb/MMscf)
VOC (lb/hr) = (6.13 MMBtu/hr) / (2,088 btu/scf) * (5.5 lb/MMscf)
= 0.02 lb/hr VOC

[c] H_2S emissions are routed from the tanks to the flare and from the seperator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)
SO_2 (lb/hr) = (0.010 lb/hr H2S at Condensate Tanks)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)
= 0.02 lb/hr SO_2

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)
CO (T/yr) = (15,800.24 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)
= 2.18 T/yr CO

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

CALCULATION OF FLARE FEED RATES FROM FINs TK-01 THROUGH TK-03, and TRUCK1

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-01 through TK-03 and TRUCK1 Total Emissions:[a]

VOC Emissions (lb/hr):	178.25
VOC Emissions (TPY):	229.36
Hydrocarbon Emissions (lb/hr):	293.90
Hydrocarbon Emissions (TPY):	378.17

		Condensate Tanks Flash Gas	TK-01 through TK-03 and TRUCK1 Emissions[c]		Flare Feed Rate[d]	
Constituent	**Heating Value[b] (Btu/lb)**	**Weight (%)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (MMBtu/hr)**	**Annual (MMBtu/yr)**
Methane	23,861	15.93%	46.82	60.24	1.09	2,817.28
Ethane	22,304	20.53%	60.34	77.64	1.32	3,394.10
Propane	21,646	25.62%	75.30	96.89	1.60	4,110.67
I-Butane	21,242	5.66%	16.63	21.40	0.35	890.97
N-Butane	21,293	13.74%	40.38	51.96	0.84	2,168.51
I-Pentane	21,025	4.48%	13.17	16.94	0.27	698.08
N-Pentane	21,072	4.84%	14.22	18.30	0.29	755.81
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.35%	9.85	12.67	0.20	519.71
Cyclohexane	20,195	0.37%	1.09	1.40	0.02	55.42
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.25%	3.67	4.73	0.07	193.06
Octanes	20,747	0.38%	1.12	1.44	0.02	58.56
Nonanes	20,687	0.12%	0.35	0.45	0.01	18.25
Decanes Plus	20,638	0.32%	0.94	1.21	0.02	48.95
Benzene	18,172	0.17%	0.50	0.64	0.01	22.79
Toluene	18,422	0.22%	0.65	0.83	0.01	29.97
Ethylbenzene	18,658	0.02%	0.06	0.08	0.001	2.93
Xylene	18,438	0.11%	0.32	0.42	0.01	15.18
	VOC	60.65%				
				Total:	**6.13**	**15,800.24**

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-01 through TK-03 on the Tank Summary table with the uncontrolled emissions from the Condensate Truck Loading. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)
Total HC (lb/hr) = (178.25 lb/hr) * (1 / 60.65%)
Total HC (lb/hr) = 293.90 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6
MMBtu/hr Methane = (23,861 Btu/lb) * (46.82 lb/hr) * 98% / (10^6)
MMBtu/hr Methane = 1.09 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6
MMBtu/yr Methane = (23,861 Btu/lb) * (60.24 T/yr) * (2,000 lb/T) * 98% / (10^6)
MMBtu/yr Methane = 2,817.28 MMBtu/yr

CALCULATION OF FLARE FEED RATES FROM FIN TK-04 and TRUCK2

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-04 and TRUCK2 Total Emissions:[a]

VOC Emissions (lb/hr):	1.48
VOC Emissions (TPY):	0.98
Hydrocarbon Emissions (lb/hr):	2.43
Hydrocarbon Emissions (TPY):	1.61

Constituent	Heating Value[b] (Btu/lb)	Produced Water Tanks Flash Gas Weight (%)	TK-04 and TRUCK2 Emissions[c] Hourly (lb/hr)	TK-04 and TRUCK2 Emissions[c] Annual (T/yr)	Flare Feed Rate[d] Hourly (MMBtu/hr)	Flare Feed Rate[d] Annual (MMBtu/yr)
Methane	23,861	15.69%	0.38	0.25	0.01	11.69
Ethane	22,304	20.31%	0.49	0.33	0.01	14.43
Propane	21,646	25.51%	0.62	0.41	0.01	17.39
I-Butane	21,242	5.72%	0.14	0.09	0.003	3.75
N-Butane	21,293	13.87%	0.34	0.22	0.01	9.18
I-Pentane	21,025	4.52%	0.11	0.07	0.002	2.88
N-Pentane	21,072	4.89%	0.12	0.08	0.002	3.30
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	0.08	0.05	0.002	2.05
Cyclohexane	20,195	0.37%	0.01	0.01	0.0002	0.40
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.03	0.02	0.001	0.82
Octanes	20,747	0.38%	0.01	0.01	0.0002	0.41
Nonanes	20,687	0.12%	0.003	0.002	0.0001	0.08
Decanes Plus	20,638	0.33%	0.01	0.01	0.0002	0.40
Benzene	18,172	0.17%	0.004	0.003	0.0001	0.11
Toluene	18,422	0.22%	0.01	0.004	0.0002	0.14
Ethylbenzene	18,658	0.02%	0.0005	0.0003	0.00001	0.01
Xylene	18,438	0.11%	0.003	0.002	0.0001	0.07
	VOC	60.88%				
				Total:	**0.05**	**67.11**

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-04 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (01.48 lb/hr) * (1/ 60.88%)

Total HC (lb/hr) = 2.43 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = (23,861 Btu/lb) * (0.38 lb/hr) * 98% / (10^6)

MMBtu/hr Methane = 0.01 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = (23,861 Btu/lb) * (0.25 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane = 11.69 MMBtu/yr

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT DURING FLARE DOWNTIME -SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	total loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	40
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications												VOC	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q^2	ΔTv	Hvo	T_{LA}	P_{VA}	Wv	ΔPv	Ke	Ks	L_S	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Storage (bbl/hr)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Daily Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expen. Factor	Vented Vapor Sat. Factor	Standing Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	3	V	12	25	500	Gray	Good	0.54	40	11.05	500	36.75	12.63	539.8	11.649	0.08044	3.18790	1.0933	0.11	302.62	**1.73**	**0.15**
PW	1	V	12	25	500	Gray	Good	0.54	35	0.111	500	36.75	12.63	539.8	0.032	0.00019	0.02005	0.0662	0.98	0.1	**0.001**	**0.0001**

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

The emissions shown are due to flare maintenance occuring 2% of the year. During the flare downtime the wellhead would be shut in. Therefore there would be no condensate or produced water liquids flowing to the tanks, however any liquid already in the tanks would remain and have breathing (standing losses) emissions. These emissions would not be controlled, as the flare is down for maintenance. The calculations shown demonstrate this alternative operating scenario regarding flare maintenance and downtime. Based on 2% downtime, this scenario is being shown to occur for 175.2 hours in a year.

As shown on the summary page representing the Tank Emission sent to Flare, H_2S emissions are represented as occuring when the liquid streams flash during the change from a pressurized flow to the atmospheric tank. Due to the chemical properties of H_2S, the most conservative approach is to represent that all H_2S in the liquid will immediately flash, and there will be no H_2S emitted during working and breathing while the liquids are stored. Since there will be no liquid flow during the flare downtime, there are no flash emissions and therefore no H_2S emissions from the standing loss of the tanks.

CALCULATION OF SEPARATOR GAS ROUTED TO FLARE POTENTIAL TO EMIT - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

										Potential to Emit (PTE)			
										VOC		H_2S	
Facility Identificatian Number (FIN)	Gas Throughput at Site (MSCF/day)	Gas Throughput (MSCF/hr)	Percentage of Year Separator Stream to Flare	Number of Hours per Year sent ta Flare	Gas Volume Sent ta Flare (MSCF/yr)	Gas Stream Molecular Weight (lb/lb-mol)	Max VOC Percentage in Gas (wt%)	Max H_2S Percentage in Gas (wt%)	Capture and Control Efficiency on Flare (%)	Hourly Emission Rate[b] (lb/hr)	Annual Emission Rate[c] (T/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (T/yr)
SEP-GAS	1500	62.50	6%	525.6	32,850	23.63	30%	0.04%	98%	23.38	6.14	0.03	0.01

[a] During engine maintenance at other downstream sites, the low pressure separator gas at this site may be routed to flare 6% of the year.

[b] Hourly VOC emission rates are calculated as follows:

(Gas Throughput, MSCF/hr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Maximum VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) = (VOC Emissions, lb/hr)

(62.50 MSCF/hr) / (379 scf/lb-mol) * (23.63 lb/lb-mol) * (30%) * (100% - 98%) * (1000 scf/Mscf) = 23.38 lb/hr

[c] Annual VOC emission rates are calculated as follows:

(Gas Throughput at Site, MSCF/yr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Max VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) * (1000 scf/Mscf) / (2000 lb/T) = (VOC Emissions, T/yr)

(32,850 MSCF/yr) / (379 scf/lb-mol) * (23.63 lb/lb-mol) * (30%) * (100% - 98%) * (1000 scf/Mscf) / (2000 lb/T) = 6.14 T/yr

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV[a] (Btu/scf)	Waste Gas Flow Rate Hourly (MMBtu/hr)	Waste Gas Flow Rate Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Potential to Emit Hourly[b] (lb/hr)	Potential to Emit Annual[c] (T/yr)
FL-1	FL-1	Process Flare	1,335	83.07	43,661.93	CO	0.2755	lb/MMBtu	22.89	6.01
		LP Separator Gas to Flare Event				NO_X	0.1380	lb/MMBtu	11.46	3.01
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	2.71	0.90
						H_2S	--[c]	--	0.03	0.01
						VOC	5.5	lb/MMscf	0.34	0.09

[a] Waste gas stream lower heating value was taken from the inlet gas analysis.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN Fl-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (83.07 MMBtu/hr)*(0.2755 lb/MMBtu)

= 22.89 lb/hr CO

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr) / (Lower Heating Value, Btu/scf) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (83.07 MMBtu/hr) / (1,335 btu/scf) * (5.5 lb/MMscf)

= 0.34 lb/hr VOC

[c] H_2S emissions are routed from the separator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the captured stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)

SO_2 (lb/hr) = (1.500 lb/hr H2S off Seperator)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

= 2.71 lb/hr SO_2

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)

CO (T/yr) = (43,661.93 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)

= 6.01 T/yr CO

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

CALCULATION OF FLARE FEED RATES FROM LP SEPARATOR - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Max BD Volume (Mscf/hr)	62.50
Max BD Volume (Mscf/yr)	32,850
Gas Density (lb/scf)	0.0625

Constituent	Heating Value[a] (Btu/lb)	Inlet Gas Weight (%)	Separator BD Emissions[b] Hourly (lb/hr)	Separator BD Emissions[b] Annual (T/yr)	Flare Feed Rate[c] Hourly (MMBtu/hr)	Flare Feed Rate[c] Annual (MMBtu/yr)
Methane	23,861	47.97%	1,873.83	492.44	43.82	23,030.22
Ethane	22,304	17.86%	697.66	183.34	15.25	8,014.86
Propane	21,646	13.03%	508.98	133.76	10.80	5,674.92
I-Butane	21,242	2.61%	101.95	26.79	2.12	1,115.38
N-Butane	21,293	5.50%	214.84	56.46	4.48	2,356.32
I-Pentane	21,025	2.02%	78.91	20.74	1.63	854.67
N-Pentane	21,072	2.03%	79.30	20.84	1.64	860.72
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	0.80%	31.25	8.21	0.64	336.77
Cyclohexane	20,195	0.32%	12.50	3.29	0.25	130.23
Other Hexanes	20,928	1.46%	57.03	14.99	1.17	614.87
Heptanes	20,825	0.82%	32.03	8.42	0.65	343.68
Octanes	20,747	0.21%	8.20	2.16	0.17	87.83
Nonanes	20,687	0.14%	5.47	1.44	0.11	58.39
Decanes Plus	20,638	0.04%	1.56	0.41	0.03	16.58
Benzene	18,172	0.09%	3.52	0.92	0.06	32.77
Toluene	18,422	0.24%	9.38	2.46	0.17	88.82
Ethylbenzene	18,658	0.02%	0.78	0.21	0.01	7.68
Xylene	18,438	0.10%	3.91	1.03	0.07	37.22
				Totals:	**83.07**	**43,661.93**

[a] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[b] Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

Methane (lb/hr) = Maximum BD Volume (Mscf/hr) * Gas Density (lb/scf) * Inlet Gas Weight % * 1000
Methane (lb/hr) = (62.50 Mscf/hr) * (0.0625 lb/scf) * 47.97% * 1,000
Methane (lb/hr) = 1,873.83 lb/hr

[c] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6
MMBtu/hr Methane = (23,861 Btu/lb) * (1,873.83 lb/hr) * 98% / (10^6)
MMBtu/hr Methane = 43.82 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

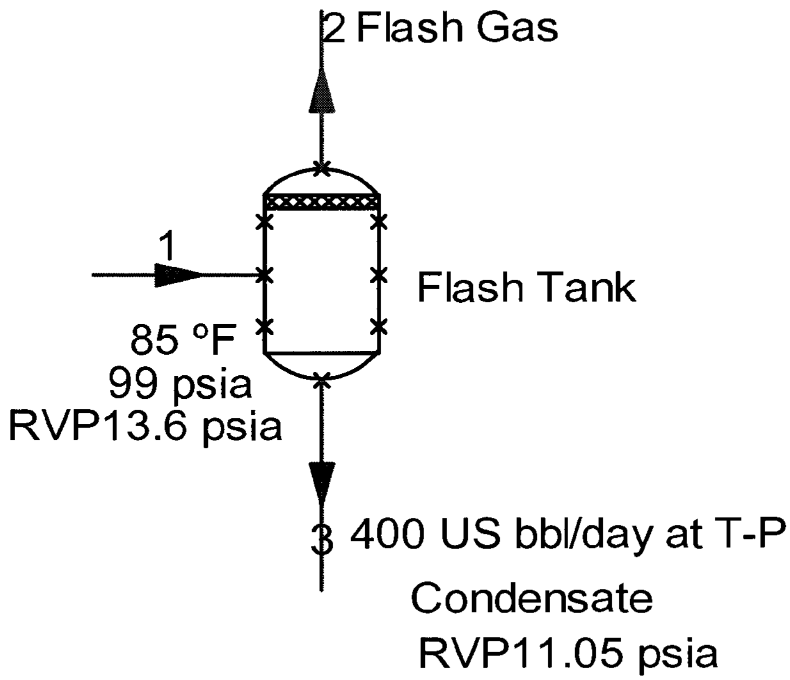
MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6
MMBtu/yr Methane = (23,861 Btu/lb) * (492.44 T/yr) * (2,000 lb/T) * 98% / (10^6)
MMBtu/yr Methane = 23,030.22 MMBtu/yr

DESIGN II for Windows

CONDENSATE SUMMARY REPORT

Simulation Result: **SOLUTION REACHED**

Problem:
Project:
Task:
By:
At: 8-Feb-12 3:05 PM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.01813	0	0.01813	0	0.048001	
49 : CARBON DIOXIDE	0.047214	0	0.047214	0	0.125003	
2 : METHANE	0.793577	0	0.793577	0	2.10104	
3 : ETHANE	0.786023	0	0.786023	0	2.08104	
4 : PROPANE	1.36695	0	1.36695	0	3.61907	
5 : ISOBUTANE	0.47592	0	0.47592	0	1.26003	
6 : N-BUTANE	1.50783	0	1.50783	0	3.99208	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.04967	0	1.04967	0	2.77906	
8 : N-PENTANE	1.44664	0	1.44664	0	3.83008	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.77506	0	2.77506	0	7.34715	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.160906	0	0.160906	0	0.426009	
38 : CYCLOHEXANE	0.40642	0	0.40642	0	1.07602	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	2.93975	0	2.93975	0	7.78316	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.68895	0	0.68895	0	1.82404	
12 : N-OCTANE	2.49971	0	2.49971	0	6.61813	
45 : ETHYL BENZENE	0.167327	0	0.167327	0	0.443009	
43 : M-XYLENE	0.994899	0	0.994899	0	2.63405	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.25382	0	2.25382	0	5.96712	
14 : N-DECANE	17.3918	0	17.3918	0	46.0459	
62 : WATER	0	0	0	0	0	
Total	37.7706	0	37.7706	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.50789	0	0.50789	0	0.012061
49 : CARBON DIOXIDE	2.07784	0	2.07784	0	0.049344
2 : METHANE	12.7313	0	12.7313	0	0.302338
3 : ETHANE	23.6341	0	23.6341	0	0.561253
4 : PROPANE	60.2742	0	60.2742	0	1.43136
5 : ISOBUTANE	27.6604	0	27.6604	0	0.656868
6 : N-BUTANE	87.6353	0	87.6353	0	2.08113
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	75.7293	0	75.7293	0	1.79839
8 : N-PENTANE	104.37	0	104.37	0	2.47852
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	239.133	0	239.133	0	5.67882
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	12.5681	0	12.5681	0	0.298461
38 : CYCLOHEXANE	34.2027	0	34.2027	0	0.812231
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	294.557	0	294.557	0	6.99501
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	63.4757	0	63.4757	0	1.50739
12 : N-OCTANE	285.527	0	285.527	0	6.78057
45 : ETHYL BENZENE	17.7635	0	17.7635	0	0.421839
43 : M-XYLENE	105.618	0	105.618	0	2.50818
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	289.052	0	289.052	0	6.86429
14 : N-DECANE	2474.44	0	2474.44	0	58.7619
62 : WATER	0	0	0	0	0
Total	4210.96	0	4210.96	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.046703	0	0.046703	0	0.048001
49 : CARBON DIOXIDE	0.121623	0	0.121623	0	0.125003
2 : METHANE	2.04424	0	2.04424	0	2.10104
3 : ETHANE	2.02478	0	2.02478	0	2.08104
4 : PROPANE	3.52124	0	3.52124	0	3.61907
5 : ISOBUTANE	1.22596	0	1.22596	0	1.26003
6 : N-BUTANE	3.88416	0	3.88416	0	3.99208
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.70393	0	2.70393	0	2.77906
8 : N-PENTANE	3.72654	0	3.72654	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.14853	0	7.14853	0	7.34715
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.414492	0	0.414492	0	0.426009
38 : CYCLOHEXANE	1.04693	0	1.04693	0	1.07602
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.57275	0	7.57275	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.77473	0	1.77473	0	1.82404
12 : N-OCTANE	6.43922	0	6.43922	0	6.61813
45 : ETHYL BENZENE	0.431033	0	0.431033	0	0.443009
43 : M-XYLENE	2.56285	0	2.56285	0	2.63405
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	5.80581	0	5.80581	0	5.96712
14 : N-DECANE	44.8012	0	44.8012	0	46.0459
62 : WATER	0	0	0	0	0
Total	97.2967	0	97.2967	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.010093	0	0.010093	0	0.010574
49 : CARBON DIOXIDE	0.040531	0	0.040531	0	0.042464
2 : METHANE	0.680774	0	0.680774	0	0.713241
3 : ETHANE	1.06326	0	1.06326	0	1.11397
4 : PROPANE	1.90482	0	1.90482	0	1.99567
5 : ISOBUTANE	0.787885	0	0.787885	0	0.825461
6 : N-BUTANE	2.40592	0	2.40592	0	2.52066
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.94413	0	1.94413	0	2.03685
8 : N-PENTANE	2.65174	0	2.65174	0	2.77821
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.77455	0	5.77455	0	6.04995
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.227834	0	0.227834	0	0.2387
38 : CYCLOHEXANE	0.699994	0	0.699994	0	0.733378
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	6.86313	0	6.86313	0	7.19044
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.16745	0	1.16745	0	1.22313
12 : N-OCTANE	6.47607	0	6.47607	0	6.78493
45 : ETHYL BENZENE	0.326758	0	0.326758	0	0.342341
43 : M-XYLENE	1.94936	0	1.94936	0	2.04233
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	6.42083	0	6.42083	0	6.72705
14 : N-DECANE	54.0528	0	54.0528	0	56.6307
62 : WATER	0	0	0	0	0
Total	95.4479	0	95.4479	0	100

Properties

Temperature	F	85	
Pressure	psia	98.696	
Enthalpy	Btu/hr	-552622.5	
Entropy	Btu/hr/R	-596.2866	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	37.7706	37.7706
Flowrate	lb/hr	4210.9587	4210.9587
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		111.4876	111.4876
Enthalpy	Btu/lbmol	-14631.0071	-14631.0071
Enthalpy	Btu/lb	-131.2344	-131.2344
Entropy	Btu/lbmol/R	-15.787	-15.787
Entropy	Btu/lb/R	-0.141604	-0.141604
Cp	Btu/lbmol/R		56.3698
Cp	Btu/lb/R		0.5056
Cv	Btu/lbmol/R		49.3271
Cv	Btu/lb/R		0.4424
Cp/Cv			1.1428
Density	lb/ft3		43.2796
Z-Factor			0.043502
Flowrate (T-P)	gal/min		12.1313
Flowrate (STP)	gal/min		11.9
Specific Gravity	GPA STP		0.707396
Viscosity	cP		0.495811
Thermal Conductivity	Btu/hr/ft/R		0.068329
Surface Tension	dyne/cm		19.1391
Reid Vapor Pressure (ASTM-A	psia		13.6
True Vapor Pressure at 100 F	psia		95.25
Critical Temperature (Cubic E	F	593.0848	
Critical Pressure (Cubic EOS)	psia	479.1639	
Dew Point Temperature	F	452.1604	
Bubble Point Temperature	F	107.7105	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	88.6915	
Latent Heat of Vaporization (N	Btu/lb	103.1429	
Latent Heat of Vaporization (P	Btu/lb	324.9526	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6065.23	
Heating Value (net)	Btu/SCF	5632.2	
Wobbe Number	Btu/SCF	2923.77	
Average Hydrogen Atoms		17.2137	
Average Carbon Atoms		7.8337	
Hydrogen to Carbon Ratio		2.1974	

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.017542	0.017542	0.00001649	0	0.834113	505.969
49 : CARBON DIOXIDE	0.037023	0.037023	0.000286	0	1.76039	61.6097
2 : METHANE	0.729743	0.729743	0.00179	0	34.6984	193.878
3 : ETHANE	0.501752	0.501752	0.00797	0	23.8577	29.9343
4 : PROPANE	0.426897	0.426897	0.026356	0	20.2984	7.70166
5 : ISOBUTANE	0.07158	0.07158	0.011336	0	3.40352	3.0023
6 : N-BUTANE	0.173708	0.173708	0.037404	0	8.25959	2.20818
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.045604	0.045604	0.028151	0	2.1684	0.770284
8 : N-PENTANE	0.04931	0.04931	0.039177	0	2.34465	0.598482
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.028557	0.028557	0.077003	0	1.35784	0.176335
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.001569	0.001569	0.004467	0	0.074591	0.166971
38 : CYCLOHEXANE	0.003189	0.003189	0.011305	0	0.151648	0.134139
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.009194	0.009194	0.082163	0	0.437172	0.053208
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.001727	0.001727	0.019267	0	0.082116	0.042619
12 : N-OCTANE	0.002418	0.002418	0.070016	0	0.114983	0.016422
45 : ETHYL BENZENE	0.000158	0.000158	0.004687	0	0.007493	0.015986
43 : M-XYLENE	0.000784	0.000784	0.027872	0	0.037259	0.013368
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.00069	0.00069	0.06317	0	0.032827	0.005197
14 : N-DECANE	0.001661	0.001661	0.487563	0	0.078988	0.00162
62 : WATER	0	0	0	0	0	0.024719
Total	2.10311	2.10311	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.491419	0.491419	0.000004	0	0.668823
49 : CARBON DIDXIDE	1.62933	1.62933	0.000108	0	2.21753
2 : METHANE	11.7073	11.7073	0.000248	0	15.9336
3 : ETHANE	15.0867	15.0867	0.002066	0	20.533
4 : PROPANE	18.8236	18.8236	0.01002	0	25.619
5 : ISOBUTANE	4.16021	4.16021	0.00568	0	5.66206
6 : N-BUTANE	10.0959	10.0959	0.01874	0	13.7406
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.29012	3.29012	0.01751	0	4.47787
8 : N-PENTANE	3.55755	3.55755	0.02437	0	4.84185
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	2.46079	2.46079	0.0572	0	3.34914
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.12253	0.12253	0.003008	0	0.166763
38 : CYCLOHEXANE	0.2684	0.2684	0.008202	0	0.365294
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.921238	0.921238	0.07097	0	1.25381
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.159114	0.159114	0.0153	0	0.216554
12 : N-DCTANE	0.276218	0.276218	0.06894	0	0.375934
45 : ETHYL BENZENE	0.016728	0.016728	0.004289	0	0.022767
43 : M-XYLENE	0.083187	0.083187	0.02551	0	0.113217
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.088541	0.088541	0.06984	0	0.120505
14 : N-DECANE	0.236348	0.236348	0.598	0	0.32167
62 : WATER	0	0	0	0	0
Total	73.4752	73.4752	1	0	100
	Total VOC	**44.560474**			

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	6.72135	6.72135	0	0	0.834113
49 : CARBON DIOXIDE	14.1854	14.1854	0	0	1.76039
2 : METHANE	279.602	279.602	0	0	34.6984
3 : ETHANE	192.247	192.247	0	0	23.8577
4 : PROPANE	163.566	163.566	0	0	20.2984
5 : ISOBUTANE	27.4258	27.4258	0	0	3.40352
6 : N-BUTANE	66.5565	66.5565	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	17.4731	17.4731	0	0	2.1684
8 : N-PENTANE	18.8934	18.8934	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	10.9416	10.9416	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.601058	0.601058	0	0	0.074591
38 : CYCLOHEXANE	1.22199	1.22199	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.52276	3.52276	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.661696	0.661696	0	0	0.082116
12 : N-OCTANE	0.926542	0.926542	0	0	0.114983
45 : ETHYL BENZENE	0.060376	0.060376	0	0	0.007493
43 : M-XYLENE	0.300236	0.300236	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.264521	0.264521	0	0	0.032827
14 : N-DECANE	0.636488	0.636488	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	805.808	805.808	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	6.657	6.657	0	0	0.834113
49 : CARBON DIOXIDE	14.0496	14.0496	0	0	1.76039
2 : METHANE	276.925	276.925	0	0	34.6984
3 : ETHANE	190.406	190.406	0	0	23.8577
4 : PROPANE	162	162	0	0	20.2984
5 : ISOBUTANE	27.1633	27.1633	0	0	3.40352
6 : N-BUTANE	65.9192	65.9192	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	17.3058	17.3058	0	0	2.1684
8 : N-PENTANE	18.7125	18.7125	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	10.8368	10.8368	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.595304	0.595304	0	0	0.074591
38 : CYCLOHEXANE	1.21029	1.21029	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.48904	3.48904	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.65536	0.65536	0	0	0.082116
12 : N-OCTANE	0.917671	0.917671	0	0	0.114983
45 : ETHYL BENZENE	0.059798	0.059798	0	0	0.007493
43 : M-XYLENE	0.297362	0.297362	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.261988	0.261988	0	0	0.032827
14 : N-DECANE	0.630394	0.630394	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	798.093	798.093	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	1068.573	
Entropy	Btu/hr/R	9.486216	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	2.1031	2.1031
Flowrate	lb/hr	73.4752	73.4752
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.9365	34.9365
Enthalpy	Btu/lbmol	508.0927	508.0927
Enthalpy	Btu/lb	14.5433	14.5433
Entropy	Btu/lbmol/R	4.5106	4.5106
Entropy	Btu/lb/R	0.129108	0.129108
Cp	Btu/lbmol/R		14.5903
Cp	Btu/lb/R		0.4176
Cv	Btu/lbmol/R		12.534
Cv	Btu/lb/R		0.3588
Cp/Cv			1.1641
Density	lb/ft3		0.091182
Z-Factor			0.991021
Flowrate (T-P)	ft3/s		0.223836
Flowrate (STP)	MMSCFD		0.019154
Viscosity	cP		0.009578
Thermal Conductivity	Btu/hr/ft/R		0.012708
Critical Temperature (Cubic E	F	173.1526	
Critical Pressure (Cubic EOS)	psia	1347.8257	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-259.4223	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	1142.0302	
Vapor Sonic Velocity	ft/s	927.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1964.1	
Heating Value (net)	Btu/SCF	1800.85	
Wobbe Number	Btu/SCF	1778.4	
Average Hydrogen Atoms		6.4895	
Average Carbon Atoms		2.2979	
Hydrogen to Carbon Ratio		2.8241	
Methane Number		41.29	
Motor Octane Number		98.76	

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	NBS81	Liquid 2 ThC:	NBS81	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000588	0	0.000588	0	0.001649	
49 : CARBON DIOXIDE	0.010191	0	0.010191	0	0.028573	
2 : METHANE	0.063834	0	0.063834	0	0.17897	
3 : ETHANE	0.284271	0	0.284271	0	0.797002	
4 : PROPANE	0.94005	0	0.94005	0	2.63559	
5 : ISOBUTANE	0.40434	0	0.40434	0	1.13364	
6 : N-BUTANE	1.33413	0	1.33413	0	3.74045	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.00406	0	1.00406	0	2.81506	
8 : N-PENTANE	1.39733	0	1.39733	0	3.91766	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.74651	0	2.74651	0	7.7003	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.159337	0	0.159337	0	0.44673	
38 : CYCLOHEXANE	0.403231	0	0.403231	0	1.13053	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	2.93055	0	2.93055	0	8.21631	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.687223	0	0.687223	0	1.92675	
12 : N-OCTANE	2.49729	0	2.49729	0	7.00158	
45 : ETHYL BENZENE	0.16717	0	0.16717	0	0.468689	
43 : M-XYLENE	0.994115	0	0.994115	0	2.78717	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.25313	0	2.25313	0	6.31703	
14 : N-DECANE	17.3902	0	17.3902	0	48.7563	
62 : WATER	0	0	0	0	0	
Total	35.6675	0	35.6675	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.016472	0	0.016472	0	0.000398
49 : CARBON DIOXIDE	0.448511	0	0.448511	0	0.01084
2 : METHANE	1.02409	0	1.02409	0	0.024751
3 : ETHANE	8.54746	0	8.54746	0	0.206586
4 : PROPANE	41.4506	0	41.4506	0	1.00183
5 : ISOBUTANE	23.5002	0	23.5002	0	0.567984
6 : N-BUTANE	77.5394	0	77.5394	0	1.87407
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	72.4392	0	72.4392	0	1.7508
8 : N-PENTANE	100.812	0	100.812	0	2.43655
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	236.672	0	236.672	0	5.72019
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	12.4455	0	12.4455	0	0.300799
38 : CYCLOHEXANE	33.9343	0	33.9343	0	0.820168
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	293.636	0	293.636	0	7.09696
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	63.3166	0	63.3166	0	1.53032
12 : N-OCTANE	285.251	0	285.251	0	6.89431
45 : ETHYL BENZENE	17.7467	0	17.7467	0	0.428926
43 : M-XYLENE	105.535	0	105.535	0	2.55071
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	288.964	0	288.964	0	6.98405
14 : N-DECANE	2474.2	0	2474.2	0	59.7998
62 : WATER	0	0	0	0	0
Total	4137.48	0	4137.48	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.001541	0	0.001541	0	0.001649
49 : CARBON DIOXIDE	0.026703	0	0.026703	0	0.028573
2 : METHANE	0.167256	0	0.167256	0	0.17897
3 : ETHANE	0.744836	0	0.744836	0	0.797002
4 : PROPANE	2.46308	0	2.46308	0	2.63559
5 : ISOBUTANE	1.05944	0	1.05944	0	1.13364
6 : N-BUTANE	3.49563	0	3.49563	0	3.74045
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.63081	0	2.63081	0	2.81506
8 : N-PENTANE	3.66124	0	3.66124	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.19629	0	7.19629	0	7.7003
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.41749	0	0.41749	0	0.44673
38 : CYCLOHEXANE	1.05653	0	1.05653	0	1.13053
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.67852	0	7.67852	0	8.21631
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.80064	0	1.80064	0	1.92675
12 : N-OCTANE	6.54331	0	6.54331	0	7.00158
45 : ETHYL BENZENE	0.438012	0	0.438012	0	0.468689
43 : M-XYLENE	2.60474	0	2.60474	0	2.78717
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	5.90356	0	5.90356	0	6.31703
14 : N-DECANE	45.5651	0	45.5651	0	48.7563
62 : WATER	0	0	0	0	0
Total	93.4547	0	93.4547	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000327	0	0.000327	0	0.000353
49 : CARBON DIOXIDE	0.008749	0	0.008749	0	0.009425
2 : METHANE	0.05476	0	0.05476	0	0.05899
3 : ETHANE	0.384537	0	0.384537	0	0.41424
4 : PROPANE	1.30995	0	1.30995	0	1.41113
5 : ISOBUTANE	0.669385	0	0.669385	0	0.721091
6 : N-BUTANE	2.12875	0	2.12875	0	2.29318
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.85967	0	1.85967	0	2.00332
8 : N-PENTANE	2.56135	0	2.56135	0	2.7592
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.71513	0	5.71513	0	6.15659
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.225613	0	0.225613	0	0.24304
38 : CYCLOHEXANE	0.694501	0	0.694501	0	0.748147
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	6.84166	0	6.84166	0	7.37014
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.16452	0	1.16452	0	1.25448
12 : N-OCTANE	6.46981	0	6.46981	0	6.96956
45 : ETHYL BENZENE	0.32645	0	0.32645	0	0.351666
43 : M-XYLENE	1.94783	0	1.94783	0	2.09828
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	6.41886	0	6.41886	0	6.91468
14 : N-DECANE	54.0476	0	54.0476	0	58.2225
62 : WATER	0	0	0	0	0
Total	92.8295	0	92.8295	0	100

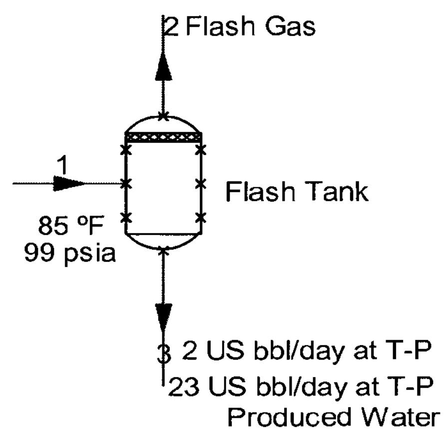
Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	-575446.1	
Entropy	Btu/hr/R	-639.7209	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	35.6675	35.6675
Flowrate	lb/hr	4137.4836	4137.4836
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		116.0014	116.0014
Enthalpy	Btu/lbmol	-16133.6115	-16133.6115
Enthalpy	Btu/lb	-139.0812	-139.0812
Entropy	Btu/lbmol/R	-17.9357	-17.9357
Entropy	Btu/lb/R	-0.154616	-0.154616
Cp	Btu/lbmol/R		57.4199
Cp	Btu/lb/R		0.495
Cv	Btu/lbmol/R		50.5021
Cv	Btu/lb/R		0.4354
Cp/Cv			1.137
Density	lb/ft3		44.2726
Z-Factor			0.006777
Flowrate (T-P)	gal/min		11.6522
Flowrate (STP)	gal/min		11.5735
Specific Gravity	GPA STP		0.714658
Viscosity	cP		0.515961
Thermal Conductivity	Btu/hr/ft/R		0.065866
Surface Tension	dyne/cm		21.2374
Reid Vapor Pressure (ASTM-A	psia		11.05
True Vapor Pressure at 100 F	psia		19.47
Critical Temperature (Cubic E	F	599.2774	
Critical Pressure (Cubic EOS)	psia	431.1843	
Dew Point Temperature	F	308.9403	
Bubble Point Temperature	F	69.9748	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.9117	
Latent Heat of Vaporization (P	Btu/lb	259.9742	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6307.05	
Heating Value (net)	Btu/SCF	5858.11	
Wobbe Number	Btu/SCF	2964.64	
Average Hydrogen Atoms		17.8461	
Average Carbon Atoms		8.1601	
Hydrogen to Carbon Ratio		2.187	

DESIGN II for Windows

Simulation Result: SOLUTION REACHED

Problem:
Project:
Task:
By:
At: 26-Apr-12 11:07 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods						
	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.0000902	0	0.00005769	0.00003251	0.00048	76.3973
49 : CARBON DIOXIDE	0.000235	0	0.00004809	0.000187	0.00125	10.619
2 : METHANE	0.003948	0	0.002742	0.001207	0.02101	30.7589
3 : ETHANE	0.003911	0	0.003622	0.000289	0.02081	5.34955
4 : PROPANE	0.006801	0	0.006631	0.00017	0.03619	1.50467
5 : ISOBUTANE	0.002368	0	0.00236	0.000008167	0.0126	0.624209
6 : N-BUTANE	0.007502	0	0.007482	0.00001944	0.03992	0.468635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE	0.005222	0	0.005217	0.000005086	0.02779	0.175808
8 : N-PENTANE	0.007197	0	0.007192	0.000005542	0.0383	0.138973
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.07402
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	0	0	0.049715
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE	0.013807	0	0.013803	0.000003394	0.07347	0.044351
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.032828
40 : BENZENE	0.000801	0	0.0008	1.816E-07	0.00426	0.040916
38 : CYCLOHEXANE	0.002022	0	0.002022	0.000000376	0.01076	0.033541
79 : 2-METHYLHEXANE	0	0	0	0	0	0.014751
80 : 3-METHYLHEXANE	0	0	0	0	0	0.014682
11 : N-HEPTANE	0.014626	0	0.014625	0.000001183	0.07783	0.01459
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.011357
41 : TOLUENE	0.003428	0	0.003427	2.169E-07	0.01824	0.011414
12 : N-OCTANE	0.012437	0	0.012436	3.367E-07	0.06618	0.004883
45 : ETHYL BENZENE	0.000832	0	0.000832	2.128E-08	0.00443	0.00461
43 : M-XYLENE	0.00495	0	0.00495	1.065E-07	0.02634	0.003879
42 : O-XYLENE	0	0	0	0	0	0.001809
13 : N-NONANE	0.011213	0	0.011213	1.042E-07	0.05967	0.001677
14 : N-DECANE	0.086529	0	0.086528	2.729E-07	0.46045	0.000569
62 : WATER	18.6043	0	0.000177	18.6041	99	6.53687
Total	18.7922	0	0.186166	18.606	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.002527	0	0.001616	0.000911	0.00071
49 : CARBON DIOXIDE	0.010338	0	0.002117	0.008221	0.002903
2 : METHANE	0.063342	0	0.043985	0.019357	0.017787
3 : ETHANE	0.117586	0	0.108897	0.008688	0.033019
4 : PROPANE	0.299879	0	0.292403	0.007476	0.084209
5 : ISOBUTANE	0.137617	0	0.137143	0.000475	0.038644
6 : N-BUTANE	0.436007	0	0.434877	0.00113	0.122435
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.376772	0	0.376405	0.000367	0.105801
8 : N-PENTANE	0.519264	0	0.518864	0.0004	0.145815
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	1.18974	0	1.18945	0.000293	0.334092
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.062529	0	0.062515	0.00001418	0.017559
38 : CYCLOHEXANE	0.170167	0	0.170135	0.00003164	0.047785
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.46549	0	1.46537	0.000119	0.411526
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.315807	0	0.315787	0.00001998	0.088682
12 : N-OCTANE	1.42057	0	1.42053	0.00003846	0.398909
45 : ETHYL BENZENE	0.088378	0	0.088375	0.000002259	0.024817
43 : M-XYLENE	0.525477	0	0.525466	0.0000113	0.147559
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	1.43811	0	1.43809	0.00001337	0.403834
14 : N-DECANE	12.3109	0	12.3109	0.00003882	3.45704
62 : WATER	335.162	0	0.003187	335.159	94.1169
Total	356.113	0	20.9061	335.207	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.000158	0	0.000149	0.00000924	0.002746
49 : CARBON DIOXIDE	0.000177	0	0.000124	0.00005309	0.003076
2 : METHANE	0.007433	0	0.007091	0.000343	0.128856
3 : ETHANE	0.009449	0	0.009366	0.00008211	0.163788
4 : PROPANE	0.017198	0	0.01715	0.00004818	0.298126
5 : ISOBUTANE	0.006105	0	0.006103	0.000002321	0.105826
6 : N-BUTANE	0.019357	0	0.019351	0.000005525	0.33554
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.013494	0	0.013493	0.000001445	0.233921
8 : N-PENTANE	0.018601	0	0.0186	0.000001575	0.322446
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.035699	0	0.035698	9.646E-07	0.61883
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.00207	0	0.00207	5.16E-08	0.035882
38 : CYCLOHEXANE	0.005229	0	0.005228	1.068E-07	0.090635
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.037823	0	0.037823	3.362E-07	0.65565
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.008864	0	0.008864	6.164E-08	0.153659
12 : N-OCTANE	0.032163	0	0.032163	9.568E-08	0.557536
45 : ETHYL BENZENE	0.002153	0	0.002153	6.047E-09	0.037321
43 : M-XYLENE	0.012801	0	0.012801	3.025E-08	0.221903
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.029	0	0.029	2.962E-08	0.5027
14 : N-DECANE	0.223781	0	0.223781	7.754E-08	3.87916
62 : WATER	5.28724	0	0.000457	5.28678	91.6524
Total	5.7688	0	0.481465	5.28733	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.00005021	0	0.00003211	0.0000181	0.000859
49 : CARBON DIOXIDE	0.000202	0	0.00004128	0.00016	0.003448
2 : METHANE	0.003387	0	0.002352	0.001035	0.057912
3 : ETHANE	0.00529	0	0.004899	0.000391	0.09045
4 : PROPANE	0.009477	0	0.009241	0.000236	0.16204
5 : ISOBUTANE	0.00392	0	0.003906	0.00001352	0.067024
6 : N-BUTANE	0.01197	0	0.011939	0.00003102	0.204667
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.009673	0	0.009663	0.00000942	0.165384
8 : N-PENTANE	0.013193	0	0.013183	0.00001016	0.225579
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.02873	0	0.028723	0.000007063	0.491232
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.001134	0	0.001133	2.571E-07	0.019381
38 : CYCLOHEXANE	0.003483	0	0.003482	6.476E-07	0.059547
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.034146	0	0.034143	0.000002762	0.583835
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.005808	0	0.005808	3.676E-07	0.099313
12 : N-OCTANE	0.03222	0	0.032219	8.723E-07	0.550909
45 : ETHYL BENZENE	0.001626	0	0.001626	4.155E-08	0.027797
43 : M-XYLENE	0.009699	0	0.009698	2.086E-07	0.165829
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.031945	0	0.031945	0.000000297	0.546209
14 : N-DECANE	0.268926	0	0.268925	0.000000848	4.59818
62 : WATER	5.37365	0	0.00005109	5.3736	91.8804
Total	5.84852	0	0.47301	5.37551	100

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-345246.5		
Entropy	Btu/hr/R	-549.6972		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7922	0.186166	18.606
Flowrate	lb/hr	356.1127	20.9061	335.2066
Mole Fraction		1	0.009907	0.990093
Mass Fraction		1	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/lbmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969.4866	-131.3661	-1021.7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
Entropy	Btu/lb/R	-1.5436	-0.141471	-1.6311
Cp	Btu/lbmol/R		56.9172	17.9928
Cp	Btu/lb/R		0.5068	0.9987
Cv	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv			1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor			0.043675	0.004799
Flowrate (T-P)	gal/min		0.060031	0.659242
Flowrate (STP)	gal/min		0.058973	0.670194
Specific Gravity	GPA STP		0.708682	0.999863
Viscosity	cP		0.535142	0.807243
Thermal Conductivity	Btu/hr/ft/R		0.067989	0.355244
Surface Tension	dyne/cm		19.4988	71.2853
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		73.11	
Critical Temperature (Cubic E	F	695.2244		
Critical Pressure (Cubic EOS	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (I	Btu/lb	857.1977		
Latent Heat of Vaporization (I	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms		2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00008539	0.00008539	0.00001636	0	0.827733	506.086
49 : CARBON DIOXIDE	0.00009429	0.00009429	0.000148	0	0.913919	61.6028
2 : METHANE	0.003491	0.003491	0.001745	0	33.839	193.912
3 : ETHANE	0.002412	0.002412	0.007808	0	23.3751	29.9379
4 : PROPANE	0.002065	0.002065	0.025989	0	20.0193	7.70283
5 : ISOBUTANE	0.000351	0.000351	0.011335	0	3.40413	3.00307
6 : N-BUTANE	0.000852	0.000852	0.037403	0	8.26093	2.20861
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.000224	0.000224	0.028151	0	2.16904	0.770489
8 : N-PENTANE	0.000242	0.000242	0.039178	0	2.34525	0.59861
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.00014	0.00014	0.077008	0	1.3584	0.176398
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.000007695	0.000007695	0.004468	0	0.074586	0.166949
38 : CYCLOHEXANE	0.00001565	0.00001565	0.011306	0	0.151666	0.134146
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.00004512	0.00004512	0.082169	0	0.43739	0.053231
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.000008472	0.000008472	0.019269	0	0.082123	0.04262
12 : N-OCTANE	0.00001187	0.00001187	0.070021	0	0.115056	0.016432
45 : ETHYL BENZENE	7.731E-07	7.731E-07	0.004687	0	0.007494	0.015987
43 : M-XYLENE	0.000003845	0.000003845	0.027874	0	0.037266	0.01337
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.000003389	0.000003389	0.063175	0	0.032852	0.0052
14 : N-DECANE	0.000008156	0.000008156	0.487599	0	0.079056	0.001621
62 : WATER	0.000255	0.000255	0.00065	0	2.46969	37.9843
Total	0.010317	0.010317	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.002392	0.002392	0.000004	0	0.670084
49 : CARBON DIOXIDE	0.004149	0.004149	0.000056	0	1.16231
2 : METHANE	0.056007	0.056007	0.000241	0	15.6883
3 : ETHANE	0.07251	0.07251	0.002024	0	20.311
4 : PROPANE	0.091069	0.091069	0.00988	0	25.5094
5 : ISOBUTANE	0.020411	0.020411	0.00568	0	5.71748
6 : N-BUTANE	0.049533	0.049533	0.01874	0	13.8748
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.016144	0.016144	0.01751	0	4.52223
8 : N-PENTANE	0.017456	0.017456	0.02437	0	4.88961
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.012076	0.012076	0.05721	0	3.38273
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.000601	0.000601	0.003008	0	0.168355
38 : CYCLOHEXANE	0.001317	0.001317	0.008203	0	0.368848
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.004521	0.004521	0.07098	0	1.26649
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.000781	0.000781	0.01531	0	0.218654
12 : N-OCTANE	0.001356	0.001356	0.06895	0	0.379788
45 : ETHYL BENZENE	0.00008207	0.00008207	0.00429	0	0.022989
43 : M-XYLENE	0.000408	0.000408	0.02551	0	0.114327
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.000435	0.000435	0.06985	0	0.121758
14 : N-DECANE	0.00116	0.00116	0.5981	0	0.325042
62 : WATER	0.00459	0.00459	0.000101	0	1.28575
Total	0.356999	0.356999	1	0	100
	Total VOC	0.22194007			

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.032712	0.032712	0	0	0.827733
49 : CARBON DIOXIDE	0.036118	0.036118	0	0	0.913919
2 : METHANE	1.33732	1.33732	0	0	33.839
3 : ETHANE	0.923782	0.923782	0	0	23.3751
4 : PROPANE	0.791159	0.791159	0	0	20.0193
5 : ISOBUTANE	0.134531	0.134531	0	0	3.40413
6 : N-BUTANE	0.326471	0.326471	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.08572	0.08572	0	0	2.16904
8 : N-PENTANE	0.092684	0.092684	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.053684	0.053684	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002948	0.002948	0	0	0.074586
38 : CYCLOHEXANE	0.005994	0.005994	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.017286	0.017286	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.003245	0.003245	0	0	0.082123
12 : N-OCTANE	0.004547	0.004547	0	0	0.115056
45 : ETHYL BENZENE	0.000296	0.000296	0	0	0.007494
43 : M-XYLENE	0.001473	0.001473	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.001298	0.001298	0	0	0.032852
14 : N-DECANE	0.003124	0.003124	0	0	0.079056
62 : WATER	0.097602	0.097602	0	0	2.46969
Total	3.95199	3.95199	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.032406	0.032406	0	0	0.827733
49 : CARBON DIOXIDE	0.03578	0.03578	0	0	0.913919
2 : METHANE	1.3248	1.3248	0	0	33.839
3 : ETHANE	0.915139	0.915139	0	0	23.3751
4 : PROPANE	0.783757	0.783757	0	0	20.0193
5 : ISOBUTANE	0.133272	0.133272	0	0	3.40413
6 : N-BUTANE	0.323416	0.323416	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.084918	0.084918	0	0	2.16904
8 : N-PENTANE	0.091817	0.091817	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.053182	0.053182	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.00292	0.00292	0	0	0.074586
38 : CYCLOHEXANE	0.005938	0.005938	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.017124	0.017124	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.003215	0.003215	0	0	0.082123
12 : N-OCTANE	0.004504	0.004504	0	0	0.115056
45 : ETHYL BENZENE	0.000293	0.000293	0	0	0.007494
43 : M-XYLENE	0.001459	0.001459	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.001286	0.001286	0	0	0.032852
14 : N-DECANE	0.003095	0.003095	0	0	0.079056
62 : WATER	0.096688	0.096688	0	0	2.46969
Total	3.91501	3.91501	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	5.213264	
Entropy	Btu/hr/R	0.047686213	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	0.010317	0.010317
Flowrate	lb/hr	0.356999	0.356999
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.6041	34.6041
Enthalpy	Btu/lbmol	505.323	505.323
Enthalpy	Btu/lb	14.603	14.603
Entropy	Btu/lbmol/R	4.6222	4.6222
Entropy	Btu/lb/R	0.133575	0.133575
Cp	Btu/lbmol/R		14.5338
Cp	Btu/lb/R		0.42
Cv	Btu/lbmol/R		12.4762
Cv	Btu/lb/R		0.3605
Cp/Cv			1.1649
Density	lb/ft3		0.090334
Z-Factor			0.990603
Flowrate (T-P)	ft3/s		0.001098
Flowrate (STP)	MMSCFD		0.00009396
Viscosity	cP		0.009488
Thermal Conductivity	Btu/hr/ft/R		0.012672
Critical Temperature (Cubic E	F	183.8238	
Critical Pressure (Cubic EOS	psia	1378.7974	
Dew Point Temperature	F	69.9999	
Bubble Point Temperature	F	-259.9682	
Water Dew Point	F	71.5716	
Stream Vapor Pressure	psia	1136.0205	
Vapor Sonic Velocity	ft/s	931.68	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1940.02	
Heating Value (net)	Btu/SCF	1778.92	
Wobbe Number	Btu/SCF	1764.79	
Average Hydrogen Atoms		6.4538	
Average Carbon Atoms		2.263	
Hydrogen to Carbon Ratio		2.8518	
Methane Number		41.76	
Motor Octane Number		99.05	

Details for Stream 3

Stream 3 (Produced Water)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STO
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000004808	0	0.000002902	0.000001906	0.0000256	
49 : CARBON DIOXIDE	0.000141	0	0.00002632	0.000114	0.000749	
2 : METHANE	0.000457	0	0.00031	0.000148	0.002434	
3 : ETHANE	0.001499	0	0.001385	0.000114	0.007982	
4 : PROPANE	0.004736	0	0.004612	0.000124	0.025213	
5 : ISOBUTANE	0.002017	0	0.002011	0.000005233	0.010737	
6 : N-BUTANE	0.00665	0	0.006637	0.0000127	0.035404	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.004999	0	0.004995	0.000003334	0.026614	
8 : N-PENTANE	0.006955	0	0.006952	0.000003605	0.037033	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.013666	0	0.013664	0.000002088	0.072764	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.000793	0	0.000793	1.147E-07	0.004221	
38 : CYCLOHEXANE	0.002006	0	0.002006	2.332E-07	0.010683	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.014581	0	0.01458	6.724E-07	0.077633	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.003419	0	0.003419	1.262E-07	0.018205	
12 : N-OCTANE	0.012425	0	0.012425	1.769E-07	0.066153	
45 : ETHYL BENZENE	0.000832	0	0.000832	1.152E-08	0.004428	
43 : M-XYLENE	0.004946	0	0.004946	5.729E-08	0.026334	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.01121	0	0.01121	5.05E-08	0.059685	
14 : N-DECANE	0.08652	0	0.08652	1.215E-07	0.46066	
62 : WATER	18.604	0	0.000115	18.6039	99.053	
Total	18.7819	0	0.177442	18.6044	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.000135	0	0.0000813	0.00005338	0.00003786
49 : CARBON DIOXIDE	0.006188	0	0.001159	0.00503	0.001739
2 : METHANE	0.007334	0	0.004968	0.002367	0.002062
3 : ETHANE	0.045075	0	0.041657	0.003418	0.01267
4 : PROPANE	0.20881	0	0.203345	0.005465	0.058695
5 : ISOBUTANE	0.117206	0	0.116902	0.000304	0.032946
6 : N-BUTANE	0.386474	0	0.385736	0.000738	0.108635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.360627	0	0.360387	0.000241	0.101369
8 : N-PENTANE	0.501808	0	0.501548	0.00026	0.141054
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	1.17767	0	1.17749	0.00018	0.331033
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.061928	0	0.061919	0.000008956	0.017407
38 : CYCLOHEXANE	0.16885	0	0.16883	0.00001962	0.047462
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.46097	0	1.4609	0.00006737	0.410667
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.315027	0	0.315015	0.00001163	0.088551
12 : N-OCTANE	1.41921	0	1.41919	0.0000202	0.398928
45 : ETHYL BENZENE	0.088295	0	0.088294	0.000001223	0.024819
43 : M-XYLENE	0.525069	0	0.525063	0.000006082	0.147593
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	1.43767	0	1.43766	0.000006477	0.404117
14 : N-DECANE	12.3098	0	12.3098	0.00001729	3.46018
62 : WATER	335.158	0	0.002078	335.156	94.21
Total	355.756	0	20.582	335.174	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.000008153	0	0.000007602	0.000000551	0.000139
49 : CARBON DIOXIDE	0.000102	0	0.00006896	0.00003305	0.001745
2 : METHANE	0.000854	0	0.000811	0.00004266	0.014608
3 : ETHANE	0.003662	0	0.003629	0.00003287	0.062656
4 : PROPANE	0.012115	0	0.01208	0.00003584	0.207299
5 : ISOBUTANE	0.00527	0	0.005269	0.000001513	0.090173
6 : N-BUTANE	0.017388	0	0.017385	0.000003672	0.297517
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.013085	0	0.013084	9.642E-07	0.223895
8 : N-PENTANE	0.018211	0	0.01821	0.000001043	0.311589
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.035793	0	0.035792	6.038E-07	0.612426
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002077	0	0.002076	3.315E-08	0.03553
38 : CYCLOHEXANE	0.005255	0	0.005255	6.742E-08	0.089914
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.038191	0	0.038191	1.944E-07	0.653463
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.008956	0	0.008956	3.651E-08	0.153239
12 : N-OCTANE	0.032545	0	0.032545	5.115E-08	0.556853
45 : ETHYL BENZENE	0.002179	0	0.002179	3.331E-09	0.037276
43 : M-XYLENE	0.012955	0	0.012955	1.657E-08	0.22167
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.029363	0	0.029363	1.46E-08	0.502408
14 : N-DECANE	0.22663	0	0.22663	3.514E-08	3.8777
62 : WATER	5.37981	0	0.000302	5.37951	92.0499
Total	5.84445	0	0.464789	5.37966	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000002676	0	0.000001616	0.000001061	0.00004586
49 : CARBON DIOXIDE	0.000121	0	0.0000226	0.00009811	0.002068
2 : METHANE	0.000392	0	0.000266	0.000127	0.00672
3 : ETHANE	0.002028	0	0.001874	0.000154	0.034748
4 : PROPANE	0.006599	0	0.006426	0.000173	0.113076
5 : ISOBUTANE	0.003339	0	0.00333	0.000008664	0.057207
6 : N-BUTANE	0.01061	0	0.01059	0.00002026	0.181809
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.009258	0	0.009252	0.000006176	0.158641
8 : N-PENTANE	0.01275	0	0.012743	0.000006609	0.218469
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.028438	0	0.028434	0.000004345	0.4873
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.001123	0	0.001122	1.624E-07	0.019237
38 : CYCLOHEXANE	0.003456	0	0.003455	4.016E-07	0.059215
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.03404	0	0.034039	0.00000157	0.583296
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.005794	0	0.005794	2.139E-07	0.099282
12 : N-OCTANE	0.032189	0	0.032189	4.582E-07	0.551577
45 : ETHYL BENZENE	0.001624	0	0.001624	2.25E-08	0.027831
43 : M-XYLENE	0.009691	0	0.009691	1.122E-07	0.16606
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.031936	0	0.031935	1.439E-07	0.547229
14 : N-DECANE	0.2689	0	0.2689	3.777E-07	4.60772
62 : WATER	5.37357	0	0.00003332	5.37354	92.0785
Total	5.83586	0	0.461722	5.37414	100

Properties

Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-350462.6		
Entropy	Btu/hr/R	-559.2596		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7819	0.177442	18.6044
Flowrate	lb/hr	355.7557	20.582	335.1737
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight		18.9414	115.993	18.0158
Enthalpy	Btu/lbmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Cp	Btu/lbmol/R		57.5519	17.9991
Cp	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.2825	62.3039
Z-Factor			0.006775	0.0007479
Flowrate (T-P)	gal/min		0.057951	0.670754
Flowrate (STP)	gal/min		0.057565	0.670023
Specific Gravity	GPA STP		0.714752	1
Viscosity	cP		0.555862	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.346918
Surface Tension	dyne/cm		21.2845	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.13	
Critical Temperature (Cubic E	F	695.4634		
Critical Pressure (Cubic EOS	psia	3249.6418		
Dew Point Temperature	F	211.5533		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (I	Btu/lb	925.8829		
Latent Heat of Vaporization (I	Btu/lb	1063.375		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (net)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms		2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		

RE: TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas Company LP sites

Woodall, James [James.Woodall@conocophillips.com]
Sent: Wednesday, July 11, 2012 1:12 PM
To: airog
Cc: Black, Randy C [Randy.C.Black@conocophillips.com]

TCEQ Oil & Gas Staff,

Yes, please apply these answers across the board for Burlington Resources Oil & Gas Company LP in the following counties: Live Oak, Karnes, DeWitt. I am not charged with work in the Barnett or further South in Texas near Laredo, which may have permits under Burlington. You will have to contact the appropriate technical contact for their answers.

Responses:

1. An electronic authorization letter is acceptable.

2. Burlington implements projects as equipment becomes available after making sure compliance obligations are met. Some, but not all of these have been fully implemented.

3.Burlington does not wait on TCEQ authorization to construct these facilities because that is not required under TAC 106.512 or by submitting a permit package voluntarily under the new "Barnett" standard permit. Burlington uses these two permitting devices to allow flexibility on construction timing and operational requirements.

4. There are no updates to these authorization requests at this time. If something comes up during further review, it will be addressed it in a timely manner.

As always, please do not hesitate to contact me by e-mail or phone 832.486.6508 if you require further assistance.

Regards,

James Woodall
Senior Environmental Specialist
ConocoPhillips Company

From: airog [mailto:airog@tceq.texas.gov]
Sent: Wednesday, July 11, 2012 12:47 PM
To: Woodall, James
Cc: Black, Randy C
Subject: [EXTERNAL]TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas Company LP sites

Site Name - Permit #

1. 1893 Oil & Gas Ltd Unit A1 104138
2. Joe Mahan Unit B1 104151
3. 1893 Oil & Gas Ltd Unit E1 104158
4. Rafter Two Unit C1 104148
5. Stolte Unit A1 104149
6. Dewitt Central Facility 8 104145
7. Sugarloaf Central Facility 11 104157
8. Dewitt Central Facility #10 104155
9. D Baker Unit A1 98501
12. Karnes Central Facility 4 104196
13. Seidel Unit C1 104100
14. Bensmiller Unit 1a 104106
15. D Baker Unit A2 104110
16. A Vaughn Unit A1 104101
17. J Rossett Unit A1 104105
18. Brown Jenkins Unit A1 104077
19. D Baker Unit B1 104082
20. Allen Unit A1 100363

10. Karnes Central Facility 13	104160	21. Gwosdz Unit A1	104114
11. Karnes Central Facility 8	104139	22. Jo Ann Esse Unit F1	104140
		23. Karnes Central Facility 11	104085

The TCEQ Air Permits Division Rule Registrations Section has received a registration for your sites.

In an effort to process your registration request more efficiently, please respond to the following:

In the case of Burlington Resources Oil & Gas Company LP, is it possible that the following 4 questions can be applied to **all pending** projects, as well as **any** future projects? If so, this email will no longer be neccessary. Please indicate in your response whether or not this is possible.

1. To confirm if the company agrees to receive the response letter electronically and that no hard copy will need to be sent. All completed projects can be viewed at: https://webmail.tceq.state.tx.us/gw/webpub.
2. If the company has implemented the project.
3. If the company is waiting on a response from the TCEQ before starting construction.
4. If you have any updates to the project listed above, please send them in now.

Please note that these items constitute an initial review only. A full technical review may be completed at a later date and additional questions may be added. **We would appreciate a complete response within five business days of the date of this e-mail.** Please only respond once you have fully addressed each of the requested items. If a complete response is not received, a deficiency letter may be issued allowing the company up to six months in which to respond without an additional registration fee. Further information about this voidance process may be found at: http://www.tceq.texas.gov/assets/public/permitting/air/memos/voidguide06.pdf.

For tools to complete a registration and detailed information on the PBR for Oil and Gas Handling and Production Facilities go to:
http://www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html.

For tools to complete a registration and detailed information on the Standard Permit for Oil and Gas Handling and Production Facilities go to:
http://www.tceq.texas.gov/permitting/air/newsourcereview/chemical/oil_and_gas_sp.html.

Other helpful information for oil and gas sites can be found at: www.texasoilandgashelp.org.

If you need clarification regarding the questions above, please call 512-239-1250 and request to speak to a reviewer in Rule Registration about this project.

The TCEQ continually strives to provide quality customer service and we value your opinion. We encourage you to tell us about your experience and how you believe we can improve. We ask that you take a moment to complete our customer survey to assist us in serving you better in the future.

Thank you for helping to protect the environment in Texas,

The Rule Registrations Section

TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas Company LP sites

airog
Sent: Wednesday, July 11, 2012 12:46 PM
To: james.woodall@conocophillips.com
Cc: randy.c.black@conocophillips.com

Site Name - Permit #

1. 1893 Oil & Gas Ltd Unit A1	104138	12. Karnes Central Facility 4	104196
2. Joe Mahan Unit B1	104151	13. Seidel Unit C1	104100
3. 1893 Oil & Gas Ltd Unit E1	104158	14. Bensmiller Unit 1a	104106
4. Rafter Two Unit C1	104148	15. D Baker Unit A2	104110
5. Stolte Unit A1	104149	16. A Vaughn Unit A1	104101
6. Dewitt Central Facility 8	104145	17. J Rossett Unit A1	104105
7. Sugarloaf Central Facility 11	104157	18. Brown Jenkins Unit A1	104077
8. Dewitt Central Facility #10	104155	19. D Baker Unit B1	104082
9. D Baker Unit A1	98501	20. Allen Unit A1	100363
10. Karnes Central Facility 13	104160	21. Gwosdz Unit A1	104114
11. Karnes Central Facility 8	104139	22. Jo Ann Esse Unit F1	104140
		23. Karnes Central Facility 11	104085

The TCEQ Air Permits Division Rule Registrations Section has received a registration for your sites.

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1. To confirm if the company agrees to receive the response letter electronically and that no hard copy will need to be sent. All completed projects can be viewed at: https://webmail.tceq.state.tx.us/gw/webpub.
2. If the company has implemented the project.
3. If the company is waiting on a response from the TCEQ before starting construction.
4. If you have any updates to the project listed above, please send them in now.

Please note that these items constitute an initial review only. A full technical review may be completed at a later date and additional questions may be added. **We would appreciate a complete response within five business days of the date of this e-mail.** Please only respond once you have fully addressed each of the requested items. If a complete response is not received, a deficiency letter may be issued allowing the company up to six months in which to respond without an additional registration fee. Further information about this voidance process may be found at: http://www.tceq.texas.gov/assets/public/permitting/air/memos/voidguide06.pdf.

For tools to complete a registration and detailed information on the PBR for Oil and Gas Handling and Production Facilities go to:
http://www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html.

For tools to complete a registration and detailed information on the Standard Permit for Oil and Gas Handling and Production Facilities go to:
http://www.tceq.texas.gov/permitting/air/newsourcereview/chemical/oil_and_gas_sp.html.

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Thank you for helping to protect the environment in Texas,

The Rule Registrations Section

Marcus McDermott

From: Woodall, James [James.Woodall@conocophillips.com]
Sent: Tuesday, July 10, 2012 4:14 PM
To: Marcus McDermott
Subject: Burlington Resources Oil & Gas Company Project Response - Representative Analyses

Mr. McDermott,

As we discussed on the phone today, ConocoPhillips has determined an approach to your representative analysis request that we think is appropriate for as accurate as possible in a cost effective manner. Since most of our wells are drilled in groups by area we have taken six sample sets from producing wells, each set including the composition and characteristics of low pressure gas, low pressure condensate upstream of tank, and stock tank liquids. For each area we're drilling in we have some sort of cut ratio we expect out of a well which we use to select from one of three of the sample sets (gas well, oil well, transitional well) depending on how much gas/bbl we expect to be produced. There are two main areas of drilling, three sets per area, giving the six production sets. We have also taken an inlet composition at our central facilities (one for each area) in a similar manner. Since these share pipeline at some point in the area, we think this is appropriate to use for permitting calculations. Many of these wells are not yet drilled and so we can not determine a composition to specifically match what you are requesting with the speciation you require for permitting. Since we do experience sour gas at some of our wells, we need to permit before operation and have thus been using the method descried above. As for H2S content, we do take many samples in the field and we try and pull the closest sample that has been taken to the well about to be drilled so we can apply that concentration (usually bumped up a bit) to our permit application. We've also discussed this approach with Marc Olivier, Margaret Schell, Sandhya Bhaskara, and Isaac Vela.

Please let me know if you need anything else and I'll be happy to oblige.

Regards,

James Woodall

Oil and Gas Initial Screening Sheet

Company: Burlington Resources	Permit No.: n4140	Project No.: 179758
☑ Initial ☐ Revision ☐ Renewal ☐ Response to Deficiency Previous reviewer: ______		Date Screened: 7/9/12 Initials: MM

Certified? ☑ Yes ☐ No ☑ Process/Project Description ☑ Rule description (checklists or equivalent)
☑ Signature matches RO or TC/DAR ☑ Emission Summary (Table 1a)

VOC tpy: 12.81 NOx tpy: 5.08 CO tpy: 16.17 SO_2 tpy: 1.15 H_2S tpy: ______

☐ For non-Barnett Shale SP: 106.261/106.262 speciation of all project emissions (excluding engines/turbines)

Comments: ______

☑ **Lab Analysis**
☐ Actual site ☑ Representative ☐ Included justification for representative analysis
☐ Sweet ☑ Sour ☐ ~~Analysis tested for H_2S~~ ☑ >1/4 mile to receptor (non-BSh PBR) Minimum vent height met? ☐ Yes ☐ No
☐ Gas ☐ Liquids ☐ Flash Gas Notes: ______
Comments: Applicant informed justification needed.

☑ **Tank Emissions**
☑ Condensate ☐ Crude oil ☑ Produced water ☐ Other liquids: ______
☐ TANKS 4.0 ☐ E&P Tanks ☐ Other method: ______
☑ Flash: WinSim
☑ Emissions are controlled by: flare
Comments: W/B calculated using AP 4.2 chp 7 + WinSim

☑ **Truck Loading**
☑ Condensate ☐ Crude oil ☑ Produced water
☑ 12.46 x SPM/T ☐ Other method: ______
☑ Emissions controlled by: flare ☐ Collection efficiency: ____ % ☐ Control efficiency: ____ %
Comments: ______

☒ **Compressor Engines/Turbines**
☐ Manufacturer spec. sheets or equivalent ☐ If controlled, control spec. sheets or equiv. ☐ modeling for NO_2 NAAQS
Meet NSPS JJJJ ☐ Yes ☐ No ☐ NA ☐ MACT ZZZZ ☐ property line distance or stack height method
Comments: ______

☑ **Fugitives**
☑ Gas ☑ Liquids ☑ used TCEQ emission factors
Comments: ______

☒ **Glycol Units**
☐ GRI-GLYCalc ☐ Extended analysis and prior to glycol inlet? ☐ Yes ☐ No
Comments: ______

☑ **Control Devices**
☑ Flare ☐ Combustor ☐ Thermal Oxidizer ☐ VRU
☐ NSPS 60.18 Alternate operating scenario included? ☐ Yes ☐ No
Control efficiency 98 % If over baseline efficiency, description/justification provided? ☐ Yes ☐ No
Comments: ______

☑ **MSS (optional until January 5, 2014)**
☐ Description of activity, duration, and frequency
Comments: ______

Project recommended to be transferred to technical reviewer? ☑ YES ☐ NO	E-mail sent: ______
Recommended reviewer: ______	Transfer date: ______

Date 3/30/2012

EFSCOP00005507

DEPOSIT INFORMATION FORM

DATE: 07/09/2012

REGISTRATION/PERMIT NUMBER:

ACCOUNT NUMBER - n/a
*If the customer has no account number, please indicate "no account number".

CHECK NUMBER: 24853

CHECK AMOUNT: $450.00

CHECK DATE: 06/26/2012

CHECK MAKER: Titan Engineering Inc.

PAID FOR: Burlington Resources Oil & Gas Company LP
(If different from check maker)

PERSON TAKING BACKUP: **Sandra Young**
PROGRAM/DIVISION: **OA/APD/APIRT**
TELEPHONE NUMBER: **239-1326**

Purpose of Check: pbr

Check attached below:

CASH ONLY IF ALL CheckLock™ SECURITY FEATURES LISTED ON BACK INDICATE NO TAMPERING OR COPYING

TITAN ENGINEERING, INC.
2801 NETWORK BLVD, SUITE 200
FRISCO, TX 75034

BANK OF TEXAS, NA
DALLAS, TX
32-1432/1110

24853

6/26/2012

PAY TO THE ORDER OF TCEQ $ **450.00

Four Hundred Fifty and 00/100** DOLLARS

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

VOID AFTER 90 DAYS

MEMO Agency Fee: 84800507-71.051

⑈024853⑈ ⑆111014325⑆ ⑈8092671152⑈

Details on Back

Intuit® CheckLock™ Secure Check

EFSCOP00005508

Texas Commission on Environmental Quality
Form PI-7-CERT
Certification and Registration for Permits by Rule

TCEQ

I. REGISTRANT INFORMATION		
A. Company or Other Legal Customer Name: Burlington Resources Oil & Gas Company LP		
Company Official Contact Name: Randy Black		
Title: Manager of Production Operations- GCBU		
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012		
City: Houston	State: TX	ZIP Code: 77079
Phone: (832) 486-6508	Fax: 832-486-6431	E-mail: randy.c.black@conocophillips.com
B. Technical Contact Name: James Woodall		
Title: Sr. Environmental Specialist		
Company: Burlington Resources Oil & Gas Company LP		
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012		
City: Houston	State: TX	ZIP Code: 77079
Phone: (832) 486-6508	Fax: 832-486-6431	E-mail: james.woodall@conocophillips.com
C. Facility Location Information - Street Address:		
If "NO," street address, provide written driving directions to the site: (attach description if additional space is needed)		
From the intersection of US-281 and FM 99 in Whitsett, TX head northeast on FM 99 for 4.9 miles. Turn left to stay on FM 99 and head north 2.8 miles. Turn right onto CR 271 and head east 1.66 miles and enter lease road on right and turn left, continue for 1.20 miles and turn right to continue following lease road for 1.5 miles. Site is located at the end of lease road.		
City: Whitsett	County: Live Oak	ZIP Code: 78008
D. Is the Core Data Form *(TCEQ Form 10400)* attached?		☒ YES ☐ NO
If "*No*," provide customer reference number and regulated entity number below:		
Customer Reference Number (CN): 602989436		
Regulated Entity Number (RN): TBD 106456817		
II. FACILITY AND SITE INFORMATION		
A. Name and Type of Facility: Jo Ann Esse Unit F1		☒ Permanent ☐ Portable
B. PBR claimed under **30 TAC 106** *(List all)*:		
106. 352 Oil and Gas Production Facilities	106.	
106. 492 Flares	106.	
106.	106.	
Are you claiming a **historical standard exemption or PBR**?		☐ YES ☒ NO
If "YES," enter effective date(s) and rule number(s) in the spaces provided below.		

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Form PI-7-CERT
Certification and Registration for Permits by Rule

II. FACILITY AND SITE INFORMATION *(continued)*			
C. Is there a previous Standard Exemption or PBR for the facility in this registration?			☐ YES ☒ NO
If "YES," enter registration number(s), rule number(s) and effective dates in the spaces provided below.			
D. Are there any other facilities at this site which are authorized by an Air Standard Exemption or PBR?			☐ YES ☒ NO
If "YES," enter registration number(s), rule number(s) and effective dates in the spaces provided below.			
E. Are there any other air preconstruction permits at this site?			☐ YES ☒ NO
If "YES," enter permit number(s) in the spaces provided below.			
Are there any other air preconstruction permits at this site that would be directly associated with this project?			☐ YES ☒ NO
If "YES," enter permit number(s) in the spaces provided below.			
F. Is this facility located at a site which is required to obtain a Federal Operating Permit (FOP) pursuant to 30 TAC Chapter 122?			☐ YES ☒ NO ☐ To be determined
If the site currently has an existing federal operating permit, enter the permit number.			
Check the requirements of 30 TAC Chapter 122 that will be triggered if this certification is accepted.			
☐ Initial Application for an FOP	☐ Significant Revision for an SOP	☐ Minor Revision for an SOP	
☐ Operational Flexibility/off Permit Notification for an SOP		☐ Revision for GOP	
☐ To be Determined	☒ None		
Identify the type(s) issued and/or FOP application(s) submitted/pending for the site. *(Check all that apply)*			
☐ SOP	☐ GOP	☐ GOP application/revision application: Submitted or under APD review.	
☒ N/A	☐ SOP application/revision application: submitted or under APD review.		
G. TCEQ Account Identification Number (*if known*):	TBD		

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Form PI-7-CERT
Certification and Registration for Permits by Rule

III. FEE INFORMATION		
See Section VI. for address to send fee or go to www6.tceq.texas.gov/epay to pay online.		
A. Is this certification to solely establish a federally enforceable emission limit and not authorize any new facilities?		☐ YES ☒ NO
If "YES," than no fee is required.		
If "NO," then go to Section III.B.		
B. If "YES," to any of the following three questions, a **$100** fee is required. Otherwise, a **$450** fee is required.		
Does this business have less than 100 employees?		☐ YES ☒ NO
Does this business have less than 6 million dollars in annual gross receipts?		☐ YES ☒ NO
Is this registration submitted by a governmental entity with a population of less than 10,000?		☐ YES ☒ NO
C. Enter the check, money order, or transaction number.	24853	
Enter the individual or company name printed on the check.	TITAN Engineering, Inc.	
Fee amount (*spell out*): Four Hundred and Fifty Dollars and No Cents		$ 450.00
Was fee **Paid** online?		☐ YES ☒ NO
IV. SELECTED FACILITY REVIEWS *ONLY*—TECHNICAL INFORMATION		
Note: If claiming one of the following PBRs, complete this section, then skip to Section VI., "Submitting your registration" below:		
Animal Feeding Operations 30 TAC 106.161, Livestock Auction Facilities 30 TAC 106.162, Saw Mills 30 TAC 106.223, Grain Handling, Storage and Drying 30 TAC 106.283, Auto Body Refinishing Facilities 30 TAC 106.436, and Air Curtain Incinerator 30 TAC 106.496		
A. Is the applicable PBR checklist attached which shows the facility meets all general and specific requirements of the PBR(s) being claimed?		☐ YES ☐ NO
B. Distance from this facility's emission release point to the nearest property line:		feet
Distance from this facility's emission release point to the nearest off-property structure:		feet
V. TECHNICAL INFORMATION - The following information must be submitted with this Form PI-7CERT. Place a check next to the appropriate box to verify you have included it in the submittal.		
☒ Process Flow Diagram	☒ Site Process and Project description	
☒ Emissions data and calculations	☒ Table 1(a) (Form 10153) Emission Point Summary	

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Form PI-7-CERT
Certification and Registration for Permits by Rule

V. TECHNICAL INFORMATION - The following information must be submitted with this Form PI-7CERT. Place a check next to the appropriate box to verify you have included it in the submittal. ***(continued)***	
☒ Information on meeting the specific PBR requirements *(PBR checklists maybe used and are optional.)*	☒ Information on meeting the general PBR requirements 30 TAC 106.4. *(PBR checklists maybe used and are optional.)*

Note: Please be reminded that if the facilities listed in this registration are subject to the Mass Emissions Cap & Trade program under ***30 TAC Chapter 101, Subchapter H, Division 3****, the owner/operator of these facilities must possess NO_x allowances equivalent to the actual NO_x, emissions from these facilities.*

Distance from this facility's emission release point to the nearest property line:	>50	feet
Distance from this facility's emission release point to the nearest off-property structure:	>4700	feet

Note: In limited cases, a map or drawing of the site and surrounding land use may be requested during the technical review or at the request of the TCEQ Regional Office or local air pollution control program during an investigation.

VI. SIGNATURE FOR CERTIFICATION AND REGISTRATION

The signature below indicates that the Responsible Official has knowledge of the facts herein set forth and that the same are true, accurate, and complete to the best of my knowledge and belief. By this signature, the maximum emission rates listed on this certification reflect the maximum anticipated emissions due to the operation of this facility and all representations in this certification of emissions are conditions upon which the facilities and sources will operate. It is understood that it is unlawful to vary from these representations unless the certification is first revised. The signature certifies that to the best of the Responsible Official's knowledge and belief, the project will satisfy the conditions and limitations of the indicated exemption or permit by rule and the facility will operated in compliance with all regulations of the Texas Commission on Environmental Quality and with Federal U.S. Environmental Protection Agency regulations governing air pollution. The signature below certifies that, based on information and belief formed after reasonable inquiry, the statements and information above and contained in the attached document(s) are true, accurate, and complete. **If you questions on how to fill out this form or about air quality permits. Please call (512) 239-1250.** *Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, call (512) 239-3282.*

SIGNATURE: [signature] 6/22/12
(ORIGINAL SIGNATURE REQUIRED) ***DATE***

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TCEQ

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

☑ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments ☑Yes ☐No

Describe Any Attachments: *(ex. Title V Application, Waste Transporter Application, etc.)* Permit by Rule Registration

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	**4. Regulated Entity Reference Number *(if issued)***
CN 602989436		RN TBD

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☐Owner ☐ Operator ☑ Owner & Operator
☐Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐Other:

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐Change in Legal Name (Verifiable with the Texas Secretary of State) ☑ No Change**

*****If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.***

8. Type of Customer:	☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*

10. Mailing Address:

City		State		ZIP		ZIP + 4	

11. Country Mailing Information *(if outside USA)*	**12. E-Mail Address** *(if applicable)*

13. Telephone Number	**14. Extension or Code**	**15. Fax Number** *(if applicable)*

16. Federal Tax ID *(9 digits)*	**17. TX State Franchise Tax ID** *(11 digits)*	**18. DUNS Number** *(if applicable)*	**19. TX SOS Filing Number** *(if applicable)*

20. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated? ☐ Yes ☐ No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☑ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information ☐ No Change** *(See below)*

****If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.**

23. Regulated Entity Name *(name of the site where the regulated action is taking place)*

Jo Ann Esse Unit F1

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24. Street Address of the Regulated Entity: (No P.O. Boxes)							
	City		**State**		**ZIP**		**ZIP + 4**
25. Mailing Address:	600 N Dairy Ashford						
	Westlake 3, #15012						
	City	Houston	**State**	TX	**ZIP**	77079	**ZIP + 4**
26. E-Mail Address:	james.woodall@conocophillips.com						

27. Telephone Number	**28. Extension or Code**	**29. Fax Number** (if applicable)
(832) 486-6508		832-486-6431

30. Primary SIC Code (4 digits)	**31. Secondary SIC Code** (4 digits)	**32. Primary NAICS Code** (5 or 6 digits)	**33. Secondary NAICS Code** (5 or 6 digits)
1311		211111	

34. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description.)

Natural Gas Production

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	From the intersection of US-281 and FM 99 in Whitsett, TX head northeast on FM 99 for 4.9 miles. Turn left to stay on FM 99 and head north 2.8 miles. Turn right onto CR 271 and head east 1.66 miles and enter lease road on right and turn left, continue for 1.20 miles and turn right to continue following lease road for 1.5 miles. Site is located at the end of lease road.

36. Nearest City	**County**	**State**	**Nearest ZIP Code**
Whitsett	Live Oak	TX	78008

37. Latitude (N) In Decimal:			**38. Longitude (W) In Decimal:**		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
28	42	12.00	98	8	40.00

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☑ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	James Woodall	**41. Title:**	Sr. Environmental Specialist
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(832) 486-6508	N/A		james.woodall@conocophillips.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Burlington Resources Oil & Gas Company LP	**Job Title:**	Manager of Production Operations-GCBU
Name(In Print):	Randy Black	**Phone:**	(832) 486-6508
Signature:		**Date:**	6/22/12

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TITAN ENGINEERING, INC.
2801 NETWORK BLVD, SUITE 200
FRISCO, TX 75034

BANK OF TEXAS, NA
DALLAS, TX
32-1432/1110

24853

6/26/2012

PAY TO THE ORDER OF TCEQ $ **450.00

Four Hundred Fifty and 00/100** DOLLARS

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

VOID AFTER 90 DAYS

MEMO
Agency Fee: 84800507-71.051

⑈024853⑈ ⑆111014325⑆ ⑈80926711152⑈

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TITAN ENGINEERING, INC. 24853

TCEQ 6/26/2012

Date	Type	Reference	Original Amt.	Balance Due	Discount	Payment
6/26/2012	Bill	84800507-71.051	450.00	450.00		450.00
					Check Amount	450.00

Bank of Texas Operati Agency Fee: 84800507-71.051 450.00

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TITAN Engineering, Inc.
Environmental Consulting and Management

JUL 06 2012
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July 3, 2012

AIR PERMITS DIVISION
JUL 6 2012
RECEIVED

Air Permits Initial Review Team (APIRT), MC 161
Texas Commission on Environmental Quality
12100 Park 35 Circle, Building C, Third Floor
Austin, Texas 78753

via FedEx

Subject: **Permit by Rule Registration**
Burlington Resources Oil & Gas Company LP
Jo Ann Esse Unit F1
Live Oak County, Texas
CN602989436

Mr. Johnny Bowers:

On behalf of Burlington Resources Oil & Gas Company LP (Burlington Resources), TITAN Engineering, Inc. a Division of Apex Companies, LLC (TITAN), is submitting this Permit by Rule (PBR) registration for operations at the Jo Ann Esse Unit F1 (the Site) located near Whitsett in Live Oak County, Texas. Upon authorization, this PBR will authorize the following Project:

- Three (3) controlled atmospheric condensate storage tanks and associated loading;
- One (1) controlled atmospheric produced water storage tank and associated loading;
- One (1) flare combustion control device; and
- Piping and fugitive components.

TITAN and Burlington Resources believe that the Site and its associated air emissions qualify for PBR under 30 Texas Administrative Code (TAC) §106.352 and §106.492. This letter and the following attachments constitute Burlington Resources' PBR registration submittal to the Texas Commission on Environmental Quality (TCEQ) for the Project:

- Attachment 1 presents a process/project description, area map, and process flow diagram;
- Attachment 2 contains the applicable TCEQ forms and tables;
- Attachment 3 presents emission rate calculations;
- Attachment 4 describes how the Project qualifies for PBR; and
- Attachment 5 includes supporting documentation.

Please note that a copy of this letter, the Form PI-7-CERT, CORE Data Form, and the PBR registration fee of $450 are being submitted to the TCEQ Revenue Section concurrently with this submittal.

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We would like to thank you in advance for your review and concurrence with this PBR registration. If you have any questions regarding the information presented in this letter and attachments, please do not hesitate to contact James Woodall at (832) 486-6508 or via james.woodall@conocophillips.com.

Sincerely,
TITAN Engineering, Inc.

Christina Chermak
Project Manager

Attachments
cc: Ms. Rosario Torres, TCEQ Region 14 – Corpus Christi
Mr. James Woodall, ConocoPhillips Company
TCEQ Revenue Section, MC-214, Bldg. A, Third Floor, Austin, Texas 78753
(Copy of this letter, Form PI-7-CERT, CORE Data Form, and fee only)

JUL 06 2012
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PERMIT BY RULE REGISTRATION

CN602989436

Burlington Resources Oil & Gas Company LP
Jo Ann Esse Unit F1
Live Oak County, Texas

Project No. 84800507-71.051

June 2012

TITAN ENGINEERING, INC.

ATTACHMENT 1
PROCESS/PROJECT DESCRIPTION

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 1
PROCESS/PROJECT DESCRIPTION

Jo Ann Esse Unit F1
(Referred to as "the Site")
Located in Live Oak County

This Permit by Rule (PBR) registration is being submitted to authorize three (3) condensate storage tanks and associated loading, one (1) produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. Figure 1-1 is an area map showing the location of the Site and the surrounding area. Figure 1-2 is a process flow diagram for the Site.

Normal Operations
The Site has a single well which will produce high pressure gas and liquids (condensate and water). The mixture extracted from the well will first pass through a high pressure separator where the high pressure gas will be collected and sent to pipeline. Liquids from the HP separator will then pass to a low pressure separator. Low pressure gas off of the LP separator will go to sales as well, via a low pressure pipeline.

Pressurized liquids from the low pressure separator will be divided into both produced water and condensate streams. Condensate is routed to the condensate storage tanks (FINs [Facility Identification Number] TK-01, TK-02 and TK-03) and water is routed to the produced water tank (FIN TK-04). The emissions associated with the flash from the pressure change as well as the working/breathing emissions from all tanks are routed to a flare (FIN FL-1) and are captured and controlled at a 98% efficiency. As demonstrated in the calculations, assist gas is sent to the flare to ensure that the waste gas stream can sustain combustion.

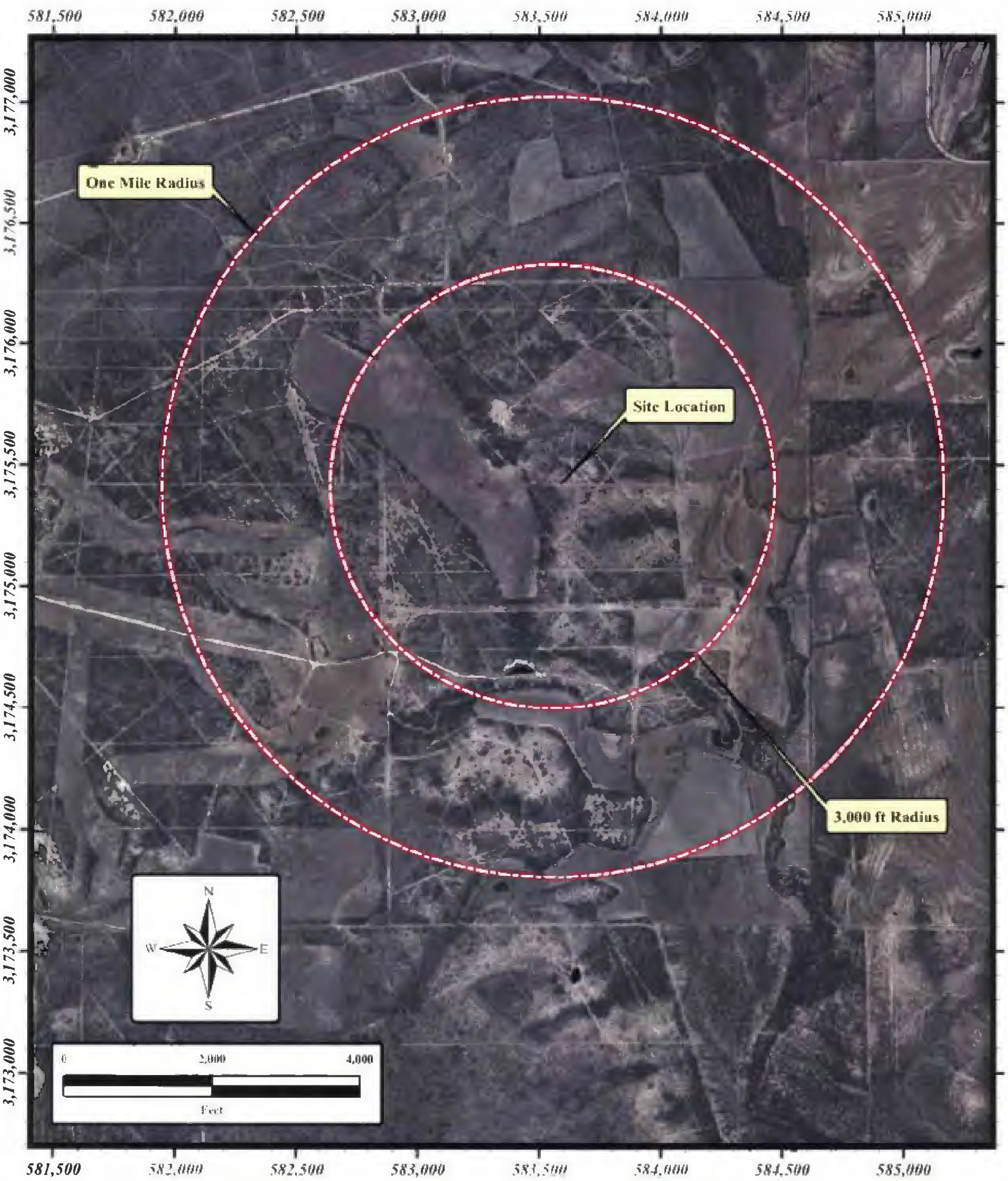
The condensate and produced water tanks are loaded out periodically (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the flare (FIN FL-1). The Site will also emit emissions due to equipment component leaks (FIN FUG).

Scheduled Maintenance Startup and Shutdown Events
In accordance with TCEQ guidance and 30 Texas Administrative Code (TAC) §106.352, a representation of planned Maintenance, Startup and Shutdown events are included in this PBR registration in addition to the normal operating scenario.

It is conservatively planned that the flare will be down for maintenance 2% of the year. During this time the well would be shut in and therefore gas and liquids would not be producing, but any liquids previously in storage tanks (FINs TK-01, TK-02, TK-03, and TK-04) would have standing losses emitted to atmosphere.

Additionally, during engine maintenance events at downstream sites the low pressure separator gas (FIN SEP-GAS) is sent to the flare (FIN FL-1) for combustion. This scenario is conservatively predicted to occur 6% of the year.

Attachment 3 contains emission rate calculations for the new air emission sources and a summary of the Site's emission rates.



Grid Presented is UTM Zone 14, NAD 1983

TITAN Engineering, Inc.

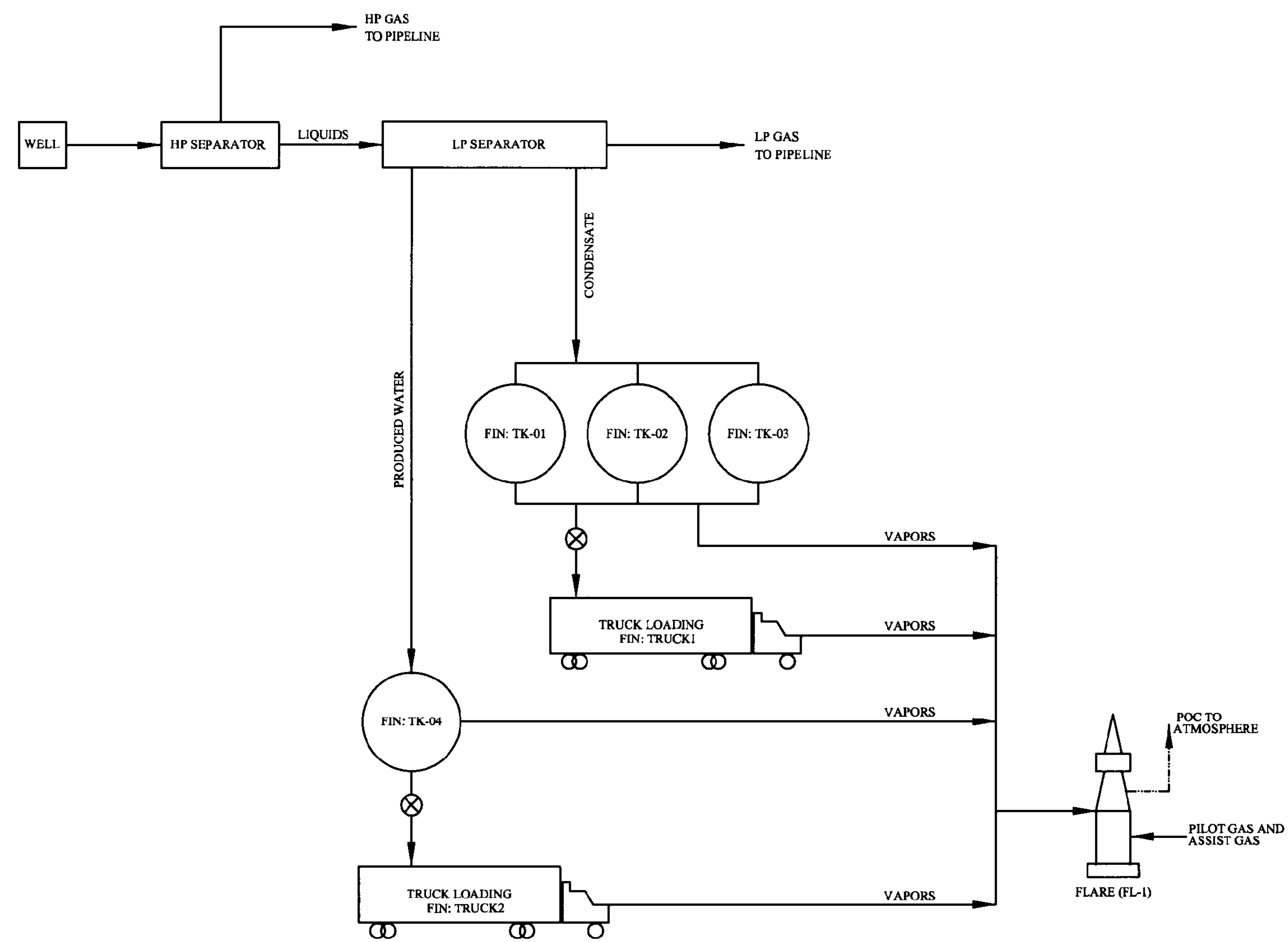
2801 Network Boulevard, Suite 200
Frisco, Texas 75034
Phone: (469) 365-1100 Fax: (469) 365-1199
www.titanengineering.com • www.apexcos.com

A Division of Apex Companies, LLC

FIGURE 1-1 AREA MAP

Burlington Resources Oil & Gas Company LP
Permit by Rule Registration
JoAnne Esse Unit F1
TITAN Project No. 507-71.051
June 2012

from USGS Quadrangle Peggy, Texas
Ground Condition Depicted March 2011
Digital Data Courtesy of ESRI Online Datasets



TITAN Engineering, Inc.
2801 NETWORK BLVD.
SUITE 200
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FIGURE 1-2
SIMPLIFIED PROCESS FLOW DIAGRAM

Burlington Resources Oil & Gas Company LP
Jo Ann Esse Unit F1
Permit by Rule Registration

DESIGNED BY: Burlington	DETAILED BY: ODL	CHECKED BY: CIC
FILE NAME: T:\ConocoPhillips\ 84800507-71.051 \Report\att1		
DATE: June / 2012	PROJECT NO.: 84800507-71.051	PLOT SCALE: NTS
DRAWING NO.: TEI-0000	REVISION: 2	FIGURE: 1-2

ATTACHMENT 2
TCEQ FORMS AND TABLES

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emissions Point Summary

Permit Number:	TBD	RN Number:	TBD	Date:	June 2012
Company Name:	Burlington Resources Oil & Gas Company LP				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA						EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height (ft)	Source						
										6. Height Above Ground (ft)	7. Stack Exit Data			8. Fugitives		
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)	Zone	East (meters)	North (meters)			Diameter (ft) (A)	Velocity (fps) (B)	Temperature (°F) (C)	Length (ft) (A)	Width (ft) (B)	Axis Degrees (C)
Normal Operations																
FUG	FUG	Site Fugitives	VOC	0.40	1.74	14	--	--	--	--	--	--	--	--	--	--
			H_2S	0.0002	0.001											
FL-1	TK-01 TK-02 TK-03	Controlled Condensate Tank Emissions	VOC	2.62	4.24	14	--	--	--	--	--	--	--	--	--	--
			H_2S	0.0002	0.001											
FL-1	TK-04	Controlled PW Tank Emissions	VOC	0.02	0.02	14	--	--	--	--	--	--	--	--	--	--
			H_2S	0.000002	0.00001											
FL-1	TRUCK1	Controlled Condensate Truck Loading	VOC	0.97	0.36	14	--	--	--	--	--	--	--	--	--	--
FL-1	TRUCK2	Controlled Produced Water Truck Loading	VOC	0.41	0.01	14	--	--	--	--	--	--	--	--	--	--
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist, and pilot)	CO	2.36	4.16	14	--	--	--	--	--	--	--	--	--	--
			NO_X	1.17	2.07											
			SO_2	0.06	0.25											
			H_2S	0.0004	0.002											
			VOC	0.03	0.06											
Scheduled Maintenance Startup and Shutdown Events																
FL-1	SEP-GAS	Low Pressure Separator Gas to Flare	VOC	23.38	6.14	14	--	--	--	--	--	--	--	--	--	--
			H_2S	0.03	0.01											
FL-1	FL-1	Flare Combustion (lp separator waste gas)	CO	22.89	6.01	14	--	--	--	--	--	--	--	--	--	--
			NO_X	11.46	3.01											
			SO_2	2.71	0.90											
			H_2S	0.03	0.01											
			VOC	0.34	0.09											
TK-01 TK-02 TK-03	TK-01 TK-02 TK-03	Uncontrolled Condensate Tank Standing Loss Emissions (during flare dnwntime)	VOC	1.73	0.15	14	--	--	--	--	--	--	--	--	--	--
TK-04	TK-04	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	VOC	0.001	0.0001	14	--	--	--	--	--	--	--	--	--	--

ATTACHMENT 3
EMISSION RATE CALCULATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT F1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

			Proposed Allowable Hourly and Annual Emission Rates											
			CO		NO_X		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC		H_2S	
EPN	FIN	Description	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Normal Operations														
FUG	FUG	Site Fugitives	--	--	--	--	--	--	--	--	0.40	1.74	0.0002	0.001
FL-1	TK-01 TK-02 TK-03	Controlled Condensate Tank Emissions	--	--	--	--	--	--	--	--	2.62	4.24	0.0002	0.001
FL-1	TK-04	Controlled PW Tank Emissions	--	--	--	--	--	--	--	--	0.02	0.02	0.000002	0.00001
FL-1	TRUCK1	Controlled Condensate Truck Loading	--	--	--	--	--	--	--	--	0.97	0.36	--	--
FL-1	TRUCK2	Controlled Produced Water Truck Loading	--	--	--	--	--	--	--	--	0.41	0.01	--	--
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist, and pilot)	2.36	4.16	1.17	2.07	--	--	0.06	0.25	0.03	0.06	0.0004	0.002
Scheduled Maintenance, Startup and Shutdown Events														
FL-1	SEP-GAS	Low Pressure Separator Gas to Flare	--	--	--	--	--	--	--	--	23.38	6.14	0.03	0.01
FL-1	FL-1	Flare Combustion (lp separator waste gas)	22.89	6.01	11.46	3.01	--	--	2.71	0.90	0.34	0.09	0.03	0.01
TK-01 TK-02 TK-03	TK-01 TK-02 TK-03	Uncontrolled Condensate Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	1.73	0.15	--	--
TK-04	TK-04	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	0.001	0.0001	--	--
		Site-Wide Emissions:	--	**10.17**	--	**5.08**	--	**0.00**	--	**1.15**	--	**12.81**	--	**0.02**

EFSCOP00005526

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Component	Number of Components	Emission Factors [a] (lb/hr-component)	Annual Operating Hours (hr/yr)	Maximum VOC[a] (wt%)	Maximum H_2S (wt%)	Reduction Credit [a] (%)	PTE VOC Hourly [b] (lb/hr)	PTE VOC Annual [c] (T/yr)	PTE H_2S Hourly [b] (lb/hr)	PTE H_2S Annual [c] (T/yr)
Valves										
Gas Streams	48	0.00992	8,760	30%	0.04%	0%	0.14	0.63	0.0002	0.001
Light Oil	29	0.0055	8,760	100%	--	0%	0.16	0.70	--	--
Water/Light Oil	45	0.000216	8,760	--	--	0%	0.01	0.04	--	--
Pumps										
Water/Light Oil	1	0.000052	8,760	--	--	0%	0.0001	0.0002	--	--
Flanges										
Gas Streams	70	0.00086	8,760	30%	0.04%	0%	0.02	0.08	0.00002	0.0001
Light Oil	26	0.000243	8,760	100%	--	0%	0.01	0.03	--	--
Water/Light Oil	8	0.000006	8,760	--	--	0%	0.00005	0.0002	--	--
Connectors										
Gas Streams	75	0.00044	8,760	30%	0.04%	0%	0.01	0.04	0.00001	0.0001
Light Oil	60	0.000463	8,760	100%	--	0%	0.03	0.12	--	--
Water/Light Oil	90	0.000243	8,760	--	--	0%	0.02	0.10	--	--
						TOTAL:	**0.40**	**1.74**	**0.0002**	**0.001**

[a] Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

[b] Hourly VOC emission rates are calculated as follows:
(48 components) * (0.00992 lb/hr-component) * (30% VOC) * (100% - 0% reduction credit) = 0.14 lb/hr

[c] Annual VOC emission rates are calculated as follows:
(48 components) * (0.00992 lb/hr-component) * (8,760 hr/yr) * (30% VOC) * (100% - 0% reduction credit) / (2,000 lb/T) = 0.63 T/yr

SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

			VOC Emissions								H_2S Emissions[c]			
			Flash Emissions[a]		Working Breathing Emissions[b]		Uncontrolled Total		Controlled Total[d]		Uncontrolled Total		Controlled Total[d]	
EPN	**FIN**	**Description**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**	**Hourly (lb/hr)**	**Annual (T/yr)**
FL-1	TK-01 TK-02 TK-03	500 bbl Condensate Storage Tanks	44.56	195.17	86.19	16.75	130.75	211.92	2.62	4.24	0.01	0.04	0.0002	0.001
FL-1	TK-04	500 bbl Produced Water Storage Tank	0.22	0.96	0.76	0.01	0.98	0.97	0.02	0.02	0.0001	0.0004	0.000002	0.00001

Notes:

[a] VOC Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

[b] The Working/Breathing emissions are calculated using AP 4.2 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

[c] The Ideal Gas Law was used to estimate the H2S emission rates using the maximum sulfur concentration in the gas coming off the tanks (200 ppm). An example calculation for hourly H2S emissions from FIN TK-04 follows:

H_2S (lb/hr) = (% Vol H_2S in stream) * (Total Volumetric Flow of Gas, scf/hr) * (1 atm STP) * (34.0798 lb/lb-mol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = (200 ppm /10^6) * (3.95 scf/hr) * (1 atm) * (34.0789 lb/lbmol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = 0.0001 lb/hr

[d] All VOC tank emissions are routed to the flare control device with a capture and control efficiency of 98%. H_2S emissions are captured at 98% and then 98% converted to SO_2 during combustion.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	total loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	40
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications																VOC	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q^2		ΔTv	Hvo	Vv	T_{LA}	P_{VA}	Wv	ΔPv	Ke	Ks	Kn	L_S	L_W	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Thruput (bbl/hr)	Annual thruput (bbl)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Vapor Space Volume (ft3)	Daily Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expan. Factor	Vented Vapor Sat. Factor	Turnover Factor	Standing Loss per tank (lb/yr)	Working Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	3	V	12	25	500	Gray	Good	0.54	40	11.05	195	146,000	36.75	12.63	1428.4	539.8	11.649	0.08044	3.18790	1.0933	0.11	0.27	15,131.22	18,368.14	**86.19**	**16.75**
PW	1	V	12	25	500	Gray	Good	0.54	35	0.111	195	9,125	36.75	12.63	1428.4	539.8	0.032	0.00019	0.02005	0.0662	0.98	1.00	6	10.22	**0.76**	**0.01**

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Sample Calculations for condensate

Loading Loss (lb/Mgal) = 12.46 * S * P * M / T (AP-42 Section 5.2)
Maximum Loading Loss = 12.46 * 0.60 * 11.050 * 40 / 560 = 5.900 lb/Mgal

Annual Emissions = (Annual Throughput, Mgal/yr) * (Average Loading Loss, lb/Mgal) * (1 - Control Efficiency) / (2000 lb/T
Annual Emissions = (6132.00 Mgal/yr) * (5.800 lb/Mgal) * (1 - 0.98) / (2000 lb/T) = 0.36 T/y:

Hourly PTE = (Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (1 - Control Efficiency
Hourly PTE = (8.19 Mgal/yr) * (5.900 lb/Mgal) * (1 - 0.98) = 0.97 lb/hı

FIN	EPN	Facility Name	S	P @ 560 °R (psia)	P @531.7 °R (psia)	M	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgals/yr)	Capture and Control Efficiency	Hourly PTE (lb/hr)	Annual PTE (T/yr)
TRUCK1	FL-1	Condensate Truck Loading	0.60	11.05	10.306	40	5.90	5.80	8.19	6,132.00	0.98	0.97	0.36
TRUCK2	FL-1	Produced Water Truck Loading	0.60	0.11	0.024	35	0.05	0.05	8.19	383.25	0.98	0.41	0.01

Daily maximum and daily minimum ambient temperature from Tanks 4.09d for this area's annual averages (81.6 and 62.5, for average of 72.1).

Annual Average Condensate Vapor Pressure at T_{LA} :
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(11.05) - 7261/(72.1+459.6) + 12.82}
10.306 psia

Annual Average Produced Water Vapor Pressure at T_{LA} :
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(11.05*.01) - 7261/(72.1+459.6) + 12.82}
0.024 psia

SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND WASTE GAS COMBUSTION POTENTIAL TO EMIT- NORMAL OPERATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	CO		NO_X		SO_2		H_2S		VOC	
			(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.04	0.003	0.01	0.001	0.002	0.0000002	0.000001	0.0001	0.0004
FL-1	FL-1	Flare Assist Gas Combustion	0.44	1.93	0.22	0.96	0.04	0.18	0.00001	0.00004	0.01	0.04
FL-1	FL-1	Waste Gas Combustion	1.91	2.19	0.95	1.10	0.02	0.07	0.0004	0.002	0.02	0.02
		Totals:	**2.36**	**4.16**	**1.17**	**2.07**	**0.06**	**0.25**	**0.0004**	**0.002**	**0.03**	**0.06**

CALCULATION OF FLARE PILOT GAS and FLARE ASSIST GAS POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV (Btu/scf)	Heat Release scf/hr	Operating Hours (hr/yr)	Pollutant	Emission Factors	Units	Emission Rates Hourly [a] (lb/hr)	Emission Rates Annual [b] (T/yr)
FL-1	FL-1	Flare 1- Process Pilot Combustion	1,292	15	8,760	CO	0.2755	lb/MMBtu	0.01	0.04
						NO_X	0.138	lb/MMBtu	0.003	0.01
						$PM/PM_{10}/PM_{2.5}$	-- [c]	--	--	--
						SO_2	200	ppm H_2S	0.0005	0.002
						H_2S	200	ppm H_2S	0.0000002	0.000001
						VOC	5.5	lb/MMscf	0.0001	0.0004
FL-1	FL-1	Flare 1- Process Flare Assist Gas Combustion	1,292	1,250	8,760	CO	0.2755	lb/MMBtu	0.44	1.93
						NO_X	0.138	lb/MMBtu	0.22	0.96
						$PM/PM_{10}/PM_{2.5}$	-- [c]	--	--	--
						SO_2	200	ppm H_2S	0.04	0.18
						H_2S	200	ppm H_2S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04

[a] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows:

CO (lb/hr) = (Heat Release, scf/hr) * (Lower Heating Value, Btu/scf) * (MM/10^6)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (15 scf/hr) * (1,292 Btu/scf) * (MM/10^6)*(0.2755 lb/MMBtu)

= | 0.01 lb/hr CO |

The Emission Factors for SO_2 and VOC were based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Heat Release, scf/hr) * (MM/10^6) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (15 scf/hr) * (MM/10^6) * (5.5 lb/MMscf)

= | 0.0001 lb/hr VOC |

A material balance approach was used to estimate the SO_2 and H_2S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 5-1, H_2S concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SO_2, and 2% will remain uncombusted and unconverted. An example calculation for hourly SO_2 emissions for the pilot gas of EPN FL-01 follows:

SO_2 (lb/hr) = Heat Release (scf/hr)*(Sulfur Content, ppmv)*(98% conversion to SO_2)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SO_2/34.065 lb H2S)

SO_2 (lb/hr) = (15 scf/hr)*(200 ppm H2S)/10^6 scf gas)*(1 lb-mol/379 scf)*(98% converted to SO2)*(34.065 lb H2S/lb-mol)*(64.06 lb SO2/34.065 lb H2S)

= | 0.0005 lb/hr SO_2 |

[b] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Hourly Emissions, lb/hr)*(Annual Operating Hours, hr/yr)*(1 T/2,000 lb)

CO (T/yr) = (0.01 lb/hr)*(8,760 hr/yr)*(1 T/2,000 lb)

CO (T/yr) = | 0.04 T/yr CO |

[c] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV[a] (Btu/scf)	Waste Gas Flow Rate Hourly (MMBtu/hr)	Waste Gas Flow Rate Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Potential to Emit Hourly[b] (lb/hr)	Potential to Emit Annual[c] (T/yr)
FL-1	FL-1	Process Flare Condensate Tanks and Loading	2,088	6.19	15,838.60	CO	0.2755	lb/MMBtu	1.71	2.18
						NO_X	0.1380	lb/MMBtu	0.85	1.09
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	0.02	0.07
						H_2S	--[c]	--	0.0002	0.001
						VOC	5.5	lb/MMscf	0.02	0.02
FL-1	FL-1	Process Flare Produced Water Tank and Loading	1,779	0.73	100.62	CO	0.2755	lb/MMBtu	0.20	0.01
						NO_X	0.1380	lb/MMBtu	0.10	0.01
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	0.0002	0.001
						H_2S	--[c]	--	0.0002	0.001
						VOC	5.5	lb/MMscf	0.002	0.0002

[a] Waste gas stream lower heating value was taken from WinSim calculated stream value.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FI-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (6.19 MMBtu/hr)*(0.2755 lb/MMBtu)

= | 1.71 lb/hr CO |

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr) / (Lower Heating Value, Btu/scf) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (6.19 MMBtu/hr) / (2,088 btu/scf) * (5.5 lb/MMscf)

= | 0.02 lb/hr VOC |

[c] H_2S emissions are routed from the tanks to the flare and from the seperator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)

SO_2 (lb/hr) = (0.010 lb/hr H2S at Condensate Tanks)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

= | 0.020 lb/hr SO_2 |

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)

CO (T/yr) = (15,838.60 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)

= | 2.18 T/yr CO |

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

EFSCOP00005533

CALCULATION OF FLARE FEED RATES FROM FINs TK-01 THROUGH TK-03, and TRUCK1

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-01 through TK-03 and TRUCK1 Total Emissions:[a]

VOC Emissions (lb/hr):	179.25
VOC Emissions (TPY):	229.92
Hydrocarbon Emissions (lb/hr):	295.55
Hydrocarbon Emissions (TPY):	379.09

Constituent	Heating Value[b] (Btu/lb)	Condensate Tanks Flash Gas Weight (%)	TK-01 through TK-03 and TRUCK1 Emissions[c] Hourly (lb/hr)	Annual (T/yr)	Flare Feed Rate[d] Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.93%	47.08	60.39	1.10	2,824.29
Ethane	22,304	20.53%	60.68	77.83	1.33	3,402.40
Propane	21,646	25.62%	75.72	97.12	1.61	4,120.43
I-Butane	21,242	5.66%	16.73	21.46	0.35	893.47
N-Butane	21,293	13.74%	40.61	52.09	0.85	2,173.94
I-Pentane	21,025	4.48%	13.24	16.98	0.27	699.73
N-Pentane	21,072	4.84%	14.30	18.35	0.30	757.88
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.35%	9.90	12.70	0.20	520.94
Cyclohexane	20,195	0.37%	1.09	1.40	0.02	55.42
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.25%	3.69	4.74	0.08	193.47
Octanes	20,747	0.38%	1.12	1.44	0.02	58.56
Nonanes	20,687	0.12%	0.35	0.45	0.01	18.25
Decanes Plus	20,638	0.32%	0.95	1.21	0.02	48.95
Benzene	18,172	0.17%	0.50	0.64	0.01	22.79
Toluene	18,422	0.22%	0.65	0.83	0.01	29.97
Ethylbenzene	18,658	0.02%	0.06	0.08	0.001	2.93
Xylene	18,438	0.11%	0.33	0.42	0.01	15.18
	VOC	60.65%				
				Total:	**6.19**	**15,838.60**

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-01 through TK-03 on the Tank Summary table with the uncontrolled emissions from the Condensate Truck Loading. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (179.25 lb/hr) * (1 / 60.65%)

Total HC (lb/hr) = 295.55 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook, Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = (23,861 Btu/lb) * (47.08 lb/hr) * 98% / (10^6)

MMBtu/hr Methane = 1.10 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = (23,861 Btu/lb) * (60.39 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane = 2,824.29 MMBtu/yr

CALCULATION OF FLARE FEED RATES FROM FIN TK-04 and TRUCK2

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-04 and TRUCK2 Total Emissions:[a]

VOC Emissions (lb/hr):	21.48
VOC Emissions (TPY):	1.47
Hydrocarbon Emissions (lb/hr):	35.28
Hydrocarbon Emissions (TPY):	2.41

Constituent	Heating Value[b] (Btu/lb)	Produced Water Tanks Flash Gas Weight (%)	TK-04 and TRUCK2 Emissions[c] Hourly (lb/hr)	TK-04 and TRUCK2 Emissions[c] Annual (T/yr)	Flare Feed Rate[d] Hourly (MMBtu/hr)	Flare Feed Rate[d] Annual (MMBtu/yr)
Methane	23,861	15.69%	5.54	0.38	0.13	17.77
Ethane	22,304	20.31%	7.17	0.49	0.16	21.42
Propane	21,646	25.51%	9.00	0.61	0.19	25.88
I-Butane	21,242	5.72%	2.02	0.14	0.04	5.83
N-Butane	21,293	13.87%	4.89	0.33	0.10	13.77
I-Pentane	21,025	4.52%	1.59	0.11	0.03	4.53
N-Pentane	21,072	4.89%	1.73	0.12	0.04	4.96
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	1.19	0.08	0.02	3.28
Cyclohexane	20,195	0.37%	0.13	0.01	0.003	0.40
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.45	0.03	0.01	1.22
Octanes	20,747	0.38%	0.13	0.01	0.003	0.41
Nonanes	20,687	0.12%	0.04	0.003	0.001	0.12
Decanes Plus	20,638	0.33%	0.12	0.01	0.002	0.40
Benzene	18,172	0.17%	0.06	0.004	0.001	0.14
Toluene	18,422	0.22%	0.08	0.01	0.001	0.36
Ethylbenzene	18,658	0.02%	0.01	0.0005	0.0002	0.02
Xylene	18,438	0.11%	0.04	0.003	0.001	0.11
	VOC	60.88%				
				Total:	**0.73**	**100.62**

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-04 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (21.48 lb/hr) * (1/ 60.88%)

Total HC (lb/hr) = 35.28 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = (23,861 Btu/lb) * (5.54 lb/hr) * 98% / (10^6)

MMBtu/hr Methane = 0.13 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = (23,861 Btu/lb) * (0.38 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane = 17.77 MMBtu/yr

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT DURING FLARE DOWNTIME -SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	total loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	40
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications												VOC	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q'	ΔTv	Hvo	T_{LA}	P_{VA}	Wv	ΔPv	Ke	Ks	L_S	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Storage (bbl/hr)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Daily Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expan. Factor	Vented Vapor Sat. Factor	Standing Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	3	V	12	25	500	Gray	Good	0.54	40	11.05	500	36.75	12.63	539.8	11.649	0.08044	3.18790	1.0933	0.11	302.62	**1.73**	**0.15**
PW	1	V	12	25	500	Gray	Good	0.54	35	0.111	500	36.75	12.63	539.8	0.032	0.00019	0.02005	0.0662	0.98	0.1	**0.001**	**0.0001**

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

The emissions shown are due to flare maintenance occuring 2% of the year. During the flare downtime the wellhead would be shut in. Therefore there would be no condensate or produced water liquids flowing to the tanks, however any liquid already in the tanks would remain and have breathing (standing losses) emissions. These emissions would not be controlled, as the flare is down for maintenance. The calculations shown demonstrate this alternative operating scenario regarding flare maintenance and downtime. Based on 2% downtime, this scenario is being shown to occur for 175.2 hours in a year.

As shown on the summary page representing the Tank Emission sent to Flare, H_2S emissions are represented as occuring when the liquid streams flash during the change from a pressurized flow to the atmospheric tank. Due to the chemical properties of H_2S, the most conservative approach is to represent that all H_2S in the liquid will immediately flash, and there will be no H_2S emitted during working and breathing while the liquids are stored. Since there will be no liquid flow during the flare downtime, there are no flash emissions and therefore no H_2S emissions from the standing loss of the tanks.

CALCULATION OF SEPARATOR GAS ROUTED TO FLARE POTENTIAL TO EMIT - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

										Potential to Emit (PTE)			
										VOC		H_2S	
Facility Identification Number (FIN)	Gas Throughput at Site (MSCF/day)	Gas Throughput (MSCF/hr)	Percentage of Year Separator Stream to Flare	Number of Hours per Year sent to Flare	Gas Volume Sent to Flare (MSCF/yr)	Gas Stream Molecular Weight (lb/lb-mol)	Max VOC Percentage in Gas (wt%)	Max H_2S Percentage in Gas (wt%)	Capture and Control Efficiency on Flare (%)	Hourly Emission Rate[b] (lb/hr)	Annual Emission Rate[c] (T/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (T/yr)
SEP-GAS	1500	62.50	6%	525.6	32,850	23.63	30%	0.04%	98%	23.38	6.14	0.03	0.01

[a] During engine maintenance at other downstream sites, the low pressure separator gas at this site may be routed to flare 6% of the year.

[b] Hourly VOC emission rates are calculated as follows:

(Gas Throughput, MSCF/hr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Maximum VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) = (VOC Emissions, lb/hr)

(62.50 MSCF/hr) / (379 scf/lb-mol) * (23.63 lb/lb-mol) * (30%) * (100% - 98%) * (1000 scf/Mscf) = 23.38 lb/hr

[c] Annual VOC emission rates are calculated as follows:

(Gas Throughput at Site, MSCF/yr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Max VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) * (1000 scf/Mscf) / (2000 lb/T) = (VOC Emissions, T/yr)

(32,850 MSCF/yr) / (379 scf/lb-mol) * (23.63 lb/lb-mol) * (30%) * (100% - 98%) * (1000 scf/Mscf) / (2000 lb/T) = 6.14 T/yr

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS - SMSS
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT FI
BURLINGTON RESOURCES OIL & GAS COMPANY LP

				Waste Gas Flow Rate					Potential to Emit	
EPN	FIN	Description	LHV[a] (Btu/scf)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Hourly[b] (lb/hr)	Annual[c] (T/yr)
FL-1	FL-1	Process Flare	1,335	83.07	43,661.93	CO	0.2755	lb/MMBtu	22.89	6.01
		LP Separator Gas to Flare Event				NO_X	0.1380	lb/MMBtu	11.46	3.01
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[c]	--	2.71	0.90
						H_2S	--[c]	--	0.03	0.01
						VOC	5.5	lb/MMscf	0.34	0.09

[a] Waste gas stream lower heating value was taken from the inlet gas analysis.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN Fl-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (83.07 MMBtu/hr)*(0.2755 lb/MMBtu)

= 22.89 lb/hr CO

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr) / (Lower Heating Value, Btu/scf) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (83.07 MMBtu/hr) / (1,335 btu/scf) * (5.5 lb/MMscf)

= 0.34 lb/hr VOC

[c] H_2S emissions are routed from the separator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the captured stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)

SO_2 (lb/hr) = (1.500 lb/hr H2S off Seperator)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

= 2.710 lb/hr SO_2

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)

CO (T/yr) = (43,661.93 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)

= 6.01 T/yr CO

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

CALCULATION OF FLARE FEED RATES FROM LP SEPARATOR - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Max BD Volume (Mscf/hr)	62.50
Max BD Volume (Mscf/yr)	32,850
Gas Density (lb/scf)	0.0625

Constituent	Heating Value[a] (Btu/lb)	Inlet Gas Weight (%)	Separator BD Emissions[b] Hourly (lb/hr)	Separator BD Emissions[b] Annual (T/yr)	Flare Feed Rate[c] Hourly (MMBtu/hr)	Flare Feed Rate[c] Annual (MMBtu/yr)
Methane	23,861	47.97%	1,873.83	492.44	43.82	23,030.22
Ethane	22,304	17.86%	697.66	183.34	15.25	8,014.86
Propane	21,646	13.03%	508.98	133.76	10.80	5,674.92
I-Butane	21,242	2.61%	101.95	26.79	2.12	1,115.38
N-Butane	21,293	5.50%	214.84	56.46	4.48	2,356.32
I-Pentane	21,025	2.02%	78.91	20.74	1.63	854.67
N-Pentane	21,072	2.03%	79.30	20.84	1.64	860.72
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	0.80%	31.25	8.21	0.64	336.77
Cyclohexane	20,195	0.32%	12.50	3.29	0.25	130.23
Other Hexanes	20,928	1.46%	57.03	14.99	1.17	614.87
Heptanes	20,825	0.82%	32.03	8.42	0.65	343.68
Octanes	20,747	0.21%	8.20	2.16	0.17	87.83
Nonanes	20,687	0.14%	5.47	1.44	0.11	58.39
Decanes Plus	20,638	0.04%	1.56	0.41	0.03	16.58
Benzene	18,172	0.09%	3.52	0.92	0.06	32.77
Toluene	18,422	0.24%	9.38	2.46	0.17	88.82
Ethylbenzene	18,658	0.02%	0.78	0.21	0.01	7.68
Xylene	18,438	0.10%	3.91	1.03	0.07	37.22
				Totals:	**83.07**	**43,661.93**

[a] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[b] Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

Methane (lb/hr) = Maximum BD Volume (Mscf/hr) * Gas Density (lb/scf) * Inlet Gas Weight % * 1000
Methane (lb/hr) = (62.50 Mscf/hr) * (0.0625 lb/scf) * 47.97% * 1,000
Methane (lb/hr) = 1,873.83 lb/hr

[c] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6
MMBtu/hr Methane = (23,861 Btu/lb) * (1,873.83 lb/hr) * 98% / (10^6)
MMBtu/hr Methane = 43.82 MMBtu/hr

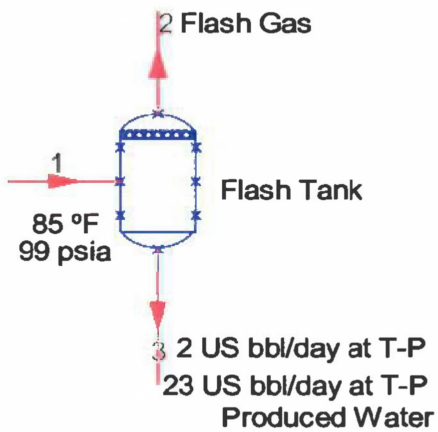
An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6
MMBtu/yr Methane = (23,861 Btu/lb) * (492.44 T/yr) * (2,000 lb/T) * 98% / (10^6)
MMBtu/yr Methane = 23,030.22 MMBtu/yr

DESIGN II for Windows

Simulation Result: SOLUTION REACHED

Problem:
Project:
Task:
By:
At: 26-Apr-12 11:07 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.0000902	0	0.00005769	0.00003251	0.00048	76.3973
49 : CARBON DIOXIDE	0.000235	0	0.00004809	0.000187	0.00125	10.619
2 : METHANE	0.003948	0	0.002742	0.001207	0.02101	30.7589
3 : ETHANE	0.003911	0	0.003622	0.000289	0.02081	5.34955
4 : PROPANE	0.006801	0	0.006631	0.00017	0.03619	1.50467
5 : ISOBUTANE	0.002368	0	0.00236	0.000008167	0.0126	0.624209
6 : N-BUTANE	0.007502	0	0.007482	0.00001944	0.03992	0.468635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE	0.005222	0	0.005217	0.000005086	0.02779	0.175808
8 : N-PENTANE	0.007197	0	0.007192	0.000005542	0.0383	0.138973
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.07402
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	0	0	0.049715
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE	0.013807	0	0.013803	0.000003394	0.07347	0.044351
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.032828
40 : BENZENE	0.000801	0	0.0008	1.816E-07	0.00426	0.040916
38 : CYCLOHEXANE	0.002022	0	0.002022	0.000000376	0.01076	0.033541
79 : 2-METHYLHEXANE	0	0	0	0	0	0.014751
80 : 3-METHYLHEXANE	0	0	0	0	0	0.014682
11 : N-HEPTANE	0.014626	0	0.014625	0.000001183	0.07783	0.01459
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.011357
41 : TOLUENE	0.003428	0	0.003427	2.169E-07	0.01824	0.011414
12 : N-OCTANE	0.012437	0	0.012436	3.367E-07	0.06618	0.004883
45 : ETHYL BENZENE	0.000832	0	0.000832	2.128E-08	0.00443	0.00461
43 : M-XYLENE	0.00495	0	0.00495	1.065E-07	0.02634	0.003879
42 : O-XYLENE	0	0	0	0	0	0.001809
13 : N-NONANE	0.011213	0	0.011213	1.042E-07	0.05967	0.001677
14 : N-DECANE	0.086529	0	0.086528	2.729E-07	0.46045	0.000569
62 : WATER	18.6043	0	0.000177	18.6041	99	6.53687
Total	18.7922	0	0.186166	18.606	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.002527	0	0.001616	0.000911	0.00071
49 : CARBON DIOXIDE	0.010338	0	0.002117	0.008221	0.002903
2 : METHANE	0.063342	0	0.043985	0.019357	0.017787
3 : ETHANE	0.117586	0	0.108897	0.008688	0.033019
4 : PROPANE	0.299879	0	0.292403	0.007476	0.084209
5 : ISOBUTANE	0.137617	0	0.137143	0.000475	0.038644
6 : N-BUTANE	0.436007	0	0.434877	0.00113	0.122435
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.376772	0	0.376405	0.000367	0.105801
8 : N-PENTANE	0.519264	0	0.518864	0.0004	0.145815
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	1.18974	0	1.18945	0.000293	0.334092
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.062529	0	0.062515	0.00001418	0.017559
38 : CYCLOHEXANE	0.170167	0	0.170135	0.00003164	0.047785
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.46549	0	1.46537	0.000119	0.411525
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.315807	0	0.315787	0.00001998	0.088682
12 : N-OCTANE	1.42057	0	1.42053	0.00003846	0.398909
45 : ETHYL BENZENE	0.088378	0	0.088375	0.000002259	0.024817
43 : M-XYLENE	0.525477	0	0.525466	0.0000113	0.147559
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	1.43811	0	1.43809	0.00001337	0.403834
14 : N-DECANE	12.3109	0	12.3109	0.00003882	3.45704
62 : WATER	335.162	0	0.003187	335.159	94.1169
Total	356.113	0	20.9061	335.207	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.000158	0	0.000149	0.00000924	0.002746
49 : CARBON DIOXIDE	0.000177	0	0.000124	0.00005309	0.003076
2 : METHANE	0.007433	0	0.007091	0.000343	0.128856
3 : ETHANE	0.009449	0	0.009366	0.00008211	0.163788
4 : PROPANE	0.017198	0	0.01715	0.00004818	0.298126
5 : ISOBUTANE	0.006105	0	0.006103	0.000002321	0.105826
6 : N-BUTANE	0.019357	0	0.019351	0.000005525	0.33554
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.013494	0	0.013493	0.000001445	0.233921
8 : N-PENTANE	0.018601	0	0.0186	0.000001575	0.322446
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.035699	0	0.035698	9.646E-07	0.61883
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.00207	0	0.00207	5.16E-08	0.035882
38 : CYCLOHEXANE	0.005229	0	0.005228	1.068E-07	0.090635
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.037823	0	0.037823	3.362E-07	0.65565
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.008864	0	0.008864	6.164E-08	0.153659
12 : N-OCTANE	0.032163	0	0.032163	9.568E-08	0.557536
45 : ETHYL BENZENE	0.002153	0	0.002153	6.047E-09	0.037321
43 : M-XYLENE	0.012801	0	0.012801	3.025E-08	0.221903
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.029	0	0.029	2.962E-08	0.5027
14 : N-DECANE	0.223781	0	0.223781	7.754E-08	3.87916
62 : WATER	5.28724	0	0.000457	5.28678	91.6524
Total	5.7688	0	0.481465	5.28733	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.00005021	0	0.00003211	0.0000181	0.000859
49 : CARBON DIOXIDE	0.000202	0	0.00004128	0.00016	0.003448
2 : METHANE	0.003387	0	0.002352	0.001035	0.057912
3 : ETHANE	0.00529	0	0.004899	0.000391	0.09045
4 : PROPANE	0.009477	0	0.009241	0.000236	0.16204
5 : ISOBUTANE	0.00392	0	0.003906	0.00001352	0.067024
6 : N-BUTANE	0.01197	0	0.011939	0.00003102	0.204667
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.009673	0	0.009663	0.00000942	0.165384
8 : N-PENTANE	0.013193	0	0.013183	0.00001016	0.225579
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.02873	0	0.028723	0.000007063	0.491232
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.001134	0	0.001133	2.571E-07	0.019381
38 : CYCLOHEXANE	0.003483	0	0.003482	6.476E-07	0.059547
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.034146	0	0.034143	0.000002762	0.583835
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.005808	0	0.005808	3.676E-07	0.099313
12 : N-OCTANE	0.03222	0	0.032219	8.723E-07	0.550909
45 : ETHYL BENZENE	0.001626	0	0.001626	4.155E-08	0.027797
43 : M-XYLENE	0.009699	0	0.009698	2.086E-07	0.165829
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.031945	0	0.031945	0.000000297	0.546209
14 : N-DECANE	0.268926	0	0.268925	0.000000848	4.59818
62 : WATER	5.37365	0	0.00005109	5.3736	91.8804
Total	5.84852	0	0.47301	5.37551	100

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-345246.5		
Entropy	Btu/hr/R	-549.6972		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7922	0.186166	18.606
Flowrate	lb/hr	356.1127	20.9061	335.2066
Mole Fraction		1	0.009907	0.990093
Mass Fraction		1	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/lbmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969.4866	-131.3661	-1021.7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
Entropy	Btu/lb/R	-1.5436	-0.141471	-1.6311
Cp	Btu/lbmol/R		56.9172	17.9928
Cp	Btu/lb/R		0.5068	0.9987
Cv	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv			1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor			0.043675	0.004799
Flowrate (T-P)	gal/min		0.060031	0.659242
Flowrate (STP)	gal/min		0.058973	0.670194
Specific Gravity	GPA STP		0.708682	0.999863
Viscosity	cP		0.535142	0.807243
Thermal Conductivity	Btu/hr/ft/R		0.067989	0.355244
Surface Tension	dyne/cm		19.4988	71.2853
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		73.11	
Critical Temperature (Cubic E	F	695.2244		
Critical Pressure (Cubic EOS	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (I	Btu/lb	857.1977		
Latent Heat of Vaporization (I	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms		2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00008539	0.00008539	0.00001636	0	0.827733	506.086
49 : CARBON DIOXIDE	0.00009429	0.00009429	0.000148	0	0.913919	61.6028
2 : METHANE	0.003491	0.003491	0.001745	0	33.839	193.912
3 : ETHANE	0.002412	0.002412	0.007808	0	23.3751	29.9379
4 : PROPANE	0.002065	0.002065	0.025989	0	20.0193	7.70283
5 : ISOBUTANE	0.000351	0.000351	0.011335	0	3.40413	3.00307
6 : N-BUTANE	0.000852	0.000852	0.037403	0	8.26093	2.20861
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.000224	0.000224	0.028151	0	2.16904	0.770489
8 : N-PENTANE	0.000242	0.000242	0.039178	0	2.34525	0.59861
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.00014	0.00014	0.077008	0	1.3584	0.176398
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.000007695	0.000007695	0.004468	0	0.074586	0.166949
38 : CYCLOHEXANE	0.00001565	0.00001565	0.011306	0	0.151666	0.134146
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.00004512	0.00004512	0.082169	0	0.43739	0.053231
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.000008472	0.000008472	0.019269	0	0.082123	0.04262
12 : N-OCTANE	0.00001187	0.00001187	0.070021	0	0.115056	0.016432
45 : ETHYL BENZENE	7.731E-07	7.731E-07	0.004687	0	0.007494	0.015987
43 : M-XYLENE	0.000003845	0.000003845	0.027874	0	0.037266	0.01337
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.000003389	0.000003389	0.063175	0	0.032852	0.0052
14 : N-DECANE	0.000008156	0.000008156	0.487599	0	0.079056	0.001621
62 : WATER	0.000255	0.000255	0.00065	0	2.46969	37.9843
Total	0.010317	0.010317	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.002392	0.002392	0.000004	0	0.670084
49 : CARBON DIOXIDE	0.004149	0.004149	0.000056	0	1.16231
2 : METHANE	0.056007	0.056007	0.000241	0	15.6883
3 : ETHANE	0.07251	0.07251	0.002024	0	20.311
4 : PROPANE	0.091069	0.091069	0.00988	0	25.5094
5 : ISOBUTANE	0.020411	0.020411	0.00568	0	5.71748
6 : N-BUTANE	0.049533	0.049533	0.01874	0	13.8748
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.016144	0.016144	0.01751	0	4.52223
8 : N-PENTANE	0.017456	0.017456	0.02437	0	4.88961
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.012076	0.012076	0.05721	0	3.38273
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.000601	0.000601	0.003008	0	0.168355
38 : CYCLOHEXANE	0.001317	0.001317	0.008203	0	0.368848
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.004521	0.004521	0.07098	0	1.26649
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.000781	0.000781	0.01531	0	0.218654
12 : N-OCTANE	0.001356	0.001356	0.06895	0	0.379788
45 : ETHYL BENZENE	0.00008207	0.00008207	0.00429	0	0.022989
43 : M-XYLENE	0.000408	0.000408	0.02551	0	0.114327
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.000435	0.000435	0.06985	0	0.121758
14 : N-DECANE	0.00116	0.00116	0.5981	0	0.325042
62 : WATER	0.00459	0.00459	0.000101	0	1.28575
Total	0.356999	0.356999	1	0	100
	Total VOC	0.22194007			

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.032712	0.032712	0	0	0.827733
49 : CARBON DIOXIDE	0.036118	0.036118	0	0	0.913919
2 : METHANE	1.33732	1.33732	0	0	33.839
3 : ETHANE	0.923782	0.923782	0	0	23.3751
4 : PROPANE	0.791159	0.791159	0	0	20.0193
5 : ISOBUTANE	0.134531	0.134531	0	0	3.40413
6 : N-BUTANE	0.326471	0.326471	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.08572	0.08572	0	0	2.16904
8 : N-PENTANE	0.092684	0.092684	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.053684	0.053684	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002948	0.002948	0	0	0.074586
38 : CYCLOHEXANE	0.005994	0.005994	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.017286	0.017286	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.003245	0.003245	0	0	0.082123
12 : N-OCTANE	0.004547	0.004547	0	0	0.115056
45 : ETHYL BENZENE	0.000296	0.000296	0	0	0.007494
43 : M-XYLENE	0.001473	0.001473	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.001298	0.001298	0	0	0.032852
14 : N-DECANE	0.003124	0.003124	0	0	0.079056
62 : WATER	0.097602	0.097602	0	0	2.46969
Total	3.95199	3.95199	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.032406	0.032406	0	0	0.827733
49 : CARBON DIOXIDE	0.03578	0.03578	0	0	0.913919
2 : METHANE	1.3248	1.3248	0	0	33.839
3 : ETHANE	0.915139	0.915139	0	0	23.3751
4 : PROPANE	0.783757	0.783757	0	0	20.0193
5 : ISOBUTANE	0.133272	0.133272	0	0	3.40413
6 : N-BUTANE	0.323416	0.323416	0	0	8.26093
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.084918	0.084918	0	0	2.16904
8 : N-PENTANE	0.091817	0.091817	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.053182	0.053182	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.00292	0.00292	0	0	0.074586
38 : CYCLOHEXANE	0.005938	0.005938	0	0	0.151666
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.017124	0.017124	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.003215	0.003215	0	0	0.082123
12 : N-OCTANE	0.004504	0.004504	0	0	0.115056
45 : ETHYL BENZENE	0.000293	0.000293	0	0	0.007494
43 : M-XYLENE	0.001459	0.001459	0	0	0.037266
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.001286	0.001286	0	0	0.032852
14 : N-DECANE	0.003095	0.003095	0	0	0.079056
62 : WATER	0.096688	0.096688	0	0	2.46969
Total	3.91501	3.91501	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	5.213264	
Entropy	Btu/hr/R	0.047686213	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	0.010317	0.010317
Flowrate	lb/hr	0.356999	0.356999
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		**34.6041**	**34.6041**
Enthalpy	Btu/lbmol	505.323	505.323
Enthalpy	Btu/lb	14.603	14.603
Entropy	Btu/lbmol/R	4.6222	4.6222
Entropy	Btu/lb/R	0.133575	0.133575
Cp	Btu/lbmol/R		14.5338
Cp	Btu/lb/R		0.42
Cv	Btu/lbmol/R		12.4762
Cv	Btu/lb/R		0.3605
Cp/Cv			1.1649
Density	lb/ft3		0.090334
Z-Factor			0.990803
Flowrate (T-P)	ft3/s		0.001098
Flowrate (STP)	MMSCFD		0.00009396
Viscosity	cP		0.009488
Thermal Conductivity	Btu/hr/ft/R		0.012672
Critical Temperature (Cubic E	F	183.8238	
Critical Pressure (Cubic EOS	psia	1378.7974	
Dew Point Temperature	F	69.9999	
Bubble Point Temperature	F	-259.9682	
Water Dew Point	F	71.5716	
Stream Vapor Pressure	psia	1136.0205	
Vapor Sonic Velocity	ft/s	931.68	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1940.02	
Heating Value (net)	**Btu/SCF**	**1778.92**	
Wobbe Number	Btu/SCF	1764.79	
Average Hydrogen Atoms		6.4538	
Average Carbon Atoms		2.263	
Hydrogen to Carbon Ratio		2.8518	
Methane Number		41.76	
Motor Octane Number		99.05	

Details for Stream 3

Stream 3 (Produced Water)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000004808	0	0.000002902	0.000001906	0.0000256	
49 : CARBON DIOXIDE	0.000141	0	0.00002632	0.000114	0.000749	
2 : METHANE	0.000457	0	0.00031	0.000148	0.002434	
3 : ETHANE	0.001499	0	0.001385	0.000114	0.007982	
4 : PROPANE	0.004736	0	0.004612	0.000124	0.025213	
5 : ISOBUTANE	0.002017	0	0.002011	0.000005233	0.010737	
6 : N-BUTANE	0.00665	0	0.006637	0.0000127	0.035404	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.004999	0	0.004995	0.000003334	0.026614	
8 : N-PENTANE	0.006955	0	0.006952	0.000003605	0.037033	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.013666	0	0.013664	0.000002088	0.072764	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.000793	0	0.000793	1.147E-07	0.004221	
38 : CYCLOHEXANE	0.002006	0	0.002006	2.332E-07	0.010683	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.014581	0	0.01458	6.724E-07	0.077633	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.003419	0	0.003419	1.262E-07	0.018205	
12 : N-OCTANE	0.012425	0	0.012425	1.769E-07	0.066153	
45 : ETHYL BENZENE	0.000832	0	0.000832	1.152E-08	0.004428	
43 : M-XYLENE	0.004946	0	0.004946	5.729E-08	0.026334	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.01121	0	0.01121	5.05E-08	0.059685	
14 : N-DECANE	0.08652	0	0.08652	1.215E-07	0.46066	
62 : WATER	18.604	0	0.000115	18.6039	99.053	
Total	18.7819	0	0.177442	18.6044	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.000135	0	0.0000813	0.00005338	0.00003786
49 : CARBON DIOXIDE	0.006188	0	0.001159	0.00503	0.001739
2 : METHANE	0.007334	0	0.004968	0.002367	0.002062
3 : ETHANE	0.045075	0	0.041657	0.003418	0.01267
4 : PROPANE	0.20881	0	0.203345	0.005465	0.058695
5 : ISOBUTANE	0.117206	0	0.116902	0.000304	0.032946
6 : N-BUTANE	0.386474	0	0.385736	0.000738	0.108635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.360627	0	0.360387	0.000241	0.101369
8 : N-PENTANE	0.501808	0	0.501548	0.00026	0.141054
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	1.17767	0	1.17749	0.00018	0.331033
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.061928	0	0.061919	0.000008956	0.017407
38 : CYCLOHEXANE	0.16885	0	0.16883	0.00001962	0.047462
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.46097	0	1.4609	0.00006737	0.410667
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.315027	0	0.315015	0.00001163	0.088551
12 : N-OCTANE	1.41921	0	1.41919	0.0000202	0.398928
45 : ETHYL BENZENE	0.088295	0	0.088294	0.000001223	0.024819
43 : M-XYLENE	0.525069	0	0.525063	0.000006082	0.147593
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	1.43767	0	1.43766	0.000006477	0.404117
14 : N-DECANE	12.3098	0	12.3098	0.00001729	3.46018
62 : WATER	335.158	0	0.002078	335.156	94.21
Total	355.756	0	20.582	335.174	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.000008153	0	0.000007602	0.000000551	0.000139
49 : CARBON DIOXIDE	0.000102	0	0.00006896	0.00003305	0.001745
2 : METHANE	0.000854	0	0.000811	0.00004266	0.014608
3 : ETHANE	0.003662	0	0.003629	0.00003287	0.062656
4 : PROPANE	0.012115	0	0.01208	0.00003584	0.207299
5 : ISOBUTANE	0.00527	0	0.005269	0.000001513	0.090173
6 : N-BUTANE	0.017388	0	0.017385	0.000003672	0.297517
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.013085	0	0.013084	9.642E-07	0.223895
8 : N-PENTANE	0.018211	0	0.01821	0.000001043	0.311589
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.035793	0	0.035792	6.038E-07	0.612426
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002077	0	0.002076	3.315E-08	0.03553
38 : CYCLOHEXANE	0.005255	0	0.005255	6.742E-08	0.089914
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.038191	0	0.038191	1.944E-07	0.653463
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.008956	0	0.008956	3.651E-08	0.153239
12 : N-OCTANE	0.032545	0	0.032545	5.115E-08	0.556853
45 : ETHYL BENZENE	0.002179	0	0.002179	3.331E-09	0.037276
43 : M-XYLENE	0.012955	0	0.012955	1.657E-08	0.22167
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.029363	0	0.029363	1.46E-08	0.502408
14 : N-DECANE	0.22663	0	0.22663	3.514E-08	3.8777
62 : WATER	5.37981	0	0.000302	5.37951	92.0499
Total	5.84445	0	0.464789	5.37966	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000002676	0	0.000001616	0.000001061	0.00004586
49 : CARBON DIOXIDE	0.000121	0	0.0000226	0.00009811	0.002068
2 : METHANE	0.000392	0	0.000266	0.000127	0.00672
3 : ETHANE	0.002028	0	0.001874	0.000154	0.034748
4 : PROPANE	0.006599	0	0.006426	0.000173	0.113076
5 : ISOBUTANE	0.003339	0	0.00333	0.000008664	0.057207
6 : N-BUTANE	0.01061	0	0.01059	0.00002026	0.181809
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.009258	0	0.009252	0.000006176	0.158641
8 : N-PENTANE	0.01275	0	0.012743	0.000006609	0.218469
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.028438	0	0.028434	0.000004345	0.4873
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.001123	0	0.001122	1.624E-07	0.019237
38 : CYCLOHEXANE	0.003456	0	0.003455	4.016E-07	0.059215
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.03404	0	0.034039	0.00000157	0.583296
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.005794	0	0.005794	2.139E-07	0.099282
12 : N-OCTANE	0.032189	0	0.032189	4.582E-07	0.551577
45 : ETHYL BENZENE	0.001624	0	0.001624	2.25E-08	0.027831
43 : M-XYLENE	0.009691	0	0.009691	1.122E-07	0.16606
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.031936	0	0.031935	1.439E-07	0.547229
14 : N-DECANE	0.2689	0	0.2689	3.777E-07	4.60772
62 : WATER	5.37357	0	0.00003332	5.37354	92.0785
Total	5.83586	0	0.461722	5.37414	100

Properties

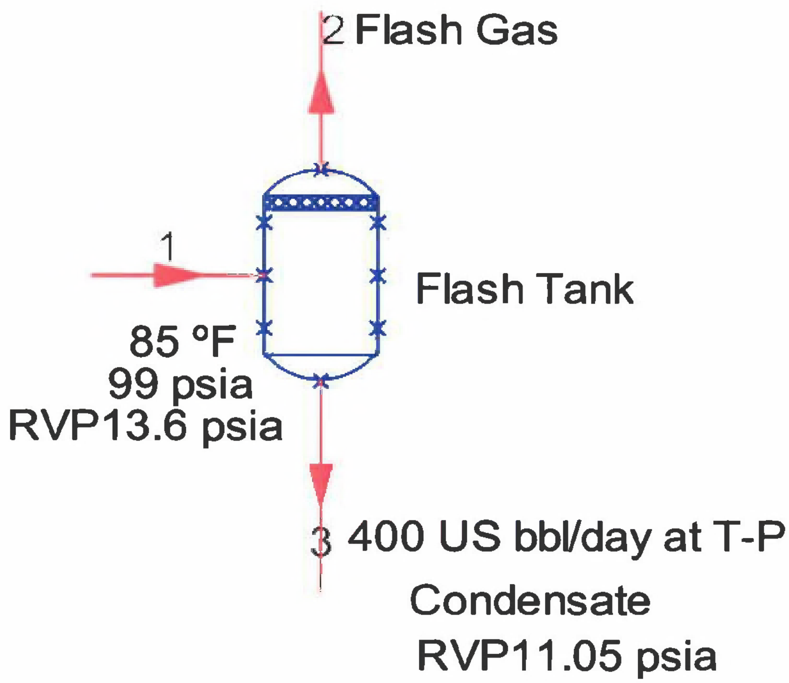
Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-350462.6		
Entropy	Btu/hr/R	-559.2596		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7819	0.177442	18.6044
Flowrate	lb/hr	355.7557	20.582	335.1737
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight		18.9414	115.993	18.0158
Enthalpy	Btu/lbmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Cp	Btu/lbmol/R		57.5519	17.9991
Cp	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.2825	62.3039
Z-Factor			0.006775	0.0007479
Flowrate (T-P)	gal/min		0.057951	0.670754
Flowrate (STP)	gal/min		0.057565	0.670023
Specific Gravity	GPA STP		0.714752	1
Viscosity	cP		0.555862	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.346918
Surface Tension	dyne/cm		21.2845	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.13	
Critical Temperature (Cubic E	F	695.4634		
Critical Pressure (Cubic EOS	psia	3249.6418		
Dew Point Temperature	F	211.5533		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (I	Btu/lb	925.8829		
Latent Heat of Vaporization (I	Btu/lb	1063.375		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (net)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms		2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		

DESIGN II for Windows

CONDENSATE SUMMARY REPORT

Simulation Result: SOLUTION REACHED

Problem:
Project:
Task:
By:
At: 8-Feb-12 3:05 PM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.01813	0	0.01813	0	0.048001	
49 : CARBON DIOXIDE	0.047214	0	0.047214	0	0.125003	
2 : METHANE	0.793577	0	0.793577	0	2.10104	
3 : ETHANE	0.786023	0	0.786023	0	2.08104	
4 : PROPANE	1.36695	0	1.36695	0	3.61907	
5 : ISOBUTANE	0.47592	0	0.47592	0	1.26003	
6 : N-BUTANE	1.50783	0	1.50783	0	3.99208	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.04967	0	1.04967	0	2.77906	
8 : N-PENTANE	1.44664	0	1.44664	0	3.83008	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.77506	0	2.77506	0	7.34715	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.160906	0	0.160906	0	0.426009	
38 : CYCLOHEXANE	0.40642	0	0.40642	0	1.07602	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	2.93975	0	2.93975	0	7.78316	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.68895	0	0.68895	0	1.82404	
12 : N-OCTANE	2.49971	0	2.49971	0	6.61813	
45 : ETHYL BENZENE	0.167327	0	0.167327	0	0.443009	
43 : M-XYLENE	0.994899	0	0.994899	0	2.63405	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.25382	0	2.25382	0	5.96712	
14 : N-DECANE	17.3918	0	17.3918	0	46.0459	
62 : WATER	0	0	0	0	0	
Total	37.7706	0	37.7706	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.50789	0	0.50789	0	0.012061
49 : CARBON DIOXIDE	2.07784	0	2.07784	0	0.049344
2 : METHANE	12.7313	0	12.7313	0	0.302338
3 : ETHANE	23.6341	0	23.6341	0	0.561253
4 : PROPANE	60.2742	0	60.2742	0	1.43136
5 : ISDBUTANE	27.6604	0	27.6604	0	0.656868
6 : N-BUTANE	87.6353	0	87.6353	0	2.08113
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	75.7293	0	75.7293	0	1.79839
8 : N-PENTANE	104.37	0	104.37	0	2.47852
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	239.133	0	239.133	0	5.67882
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	12.5681	0	12.5681	0	0.298461
38 : CYCLOHEXANE	34.2027	0	34.2027	0	0.812231
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	294.557	0	294.557	0	6.99501
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	63.4757	0	63.4757	0	1.50739
12 : N-OCTANE	285.527	0	285.527	0	6.78057
45 : ETHYL BENZENE	17.7635	0	17.7635	0	0.421839
43 : M-XYLENE	105.618	0	105.618	0	2.50818
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	289.052	0	289.052	0	6.86429
14 : N-DECANE	2474.44	0	2474.44	0	58.7619
62 : WATER	0	0	0	0	0
Total	4210.96	0	4210.96	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.046703	0	0.046703	0	0.048001
49 : CARBON DIOXIDE	0.121623	0	0.121623	0	0.125003
2 : METHANE	2.04424	0	2.04424	0	2.10104
3 : ETHANE	2.02478	0	2.02478	0	2.08104
4 : PROPANE	3.52124	0	3.52124	0	3.61907
5 : ISOBUTANE	1.22596	0	1.22596	0	1.26003
6 : N-BUTANE	3.88416	0	3.88416	0	3.99208
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.70393	0	2.70393	0	2.77906
8 : N-PENTANE	3.72654	0	3.72654	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.14853	0	7.14853	0	7.34715
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.414492	0	0.414492	0	0.426009
38 : CYCLOHEXANE	1.04693	0	1.04693	0	1.07602
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.57275	0	7.57275	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.77473	0	1.77473	0	1.82404
12 : N-OCTANE	6.43922	0	6.43922	0	6.61813
45 : ETHYL BENZENE	0.431033	0	0.431033	0	0.443009
43 : M-XYLENE	2.56285	0	2.56285	0	2.63405
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	5.80581	0	5.80581	0	5.96712
14 : N-DECANE	44.8012	0	44.8012	0	46.0459
62 : WATER	0	0	0	0	0
Total	97.2967	0	97.2967	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.010093	0	0.010093	0	0.010574
49 : CARBON DIOXIDE	0.040531	0	0.040531	0	0.042464
2 : METHANE	0.680774	0	0.680774	0	0.713241
3 : ETHANE	1.06326	0	1.06326	0	1.11397
4 : PROPANE	1.90482	0	1.90482	0	1.99567
5 : ISOBUTANE	0.787885	0	0.787885	0	0.825461
6 : N-BUTANE	2.40592	0	2.40592	0	2.52066
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.94413	0	1.94413	0	2.03685
8 : N-PENTANE	2.65174	0	2.65174	0	2.77821
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.77455	0	5.77455	0	6.04995
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.227834	0	0.227834	0	0.2387
38 : CYCLOHEXANE	0.699994	0	0.699994	0	0.733378
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	6.86313	0	6.86313	0	7.19044
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.16745	0	1.16745	0	1.22313
12 : N-OCTANE	6.47607	0	6.47607	0	6.78493
45 : ETHYL BENZENE	0.326758	0	0.326758	0	0.342341
43 : M-XYLENE	1.94936	0	1.94936	0	2.04233
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	6.42083	0	6.42083	0	6.72705
14 : N-DECANE	54.0528	0	54.0528	0	56.6307
62 : WATER	0	0	0	0	0
Total	95.4479	0	95.4479	0	100

Properties

Temperature	F	85	
Pressure	psia	98.696	
Enthalpy	Btu/hr	-552622.5	
Entropy	Btu/hr/R	-596.2866	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	37.7706	37.7706
Flowrate	lb/hr	4210.9587	4210.9587
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		111.4876	111.4876
Enthalpy	Btu/lbmol	-14631.0071	-14631.0071
Enthalpy	Btu/lb	-131.2344	-131.2344
Entropy	Btu/lbmol/R	-15.787	-15.787
Entropy	Btu/lb/R	-0.141604	-0.141604
Cp	Btu/lbmol/R		56.3698
Cp	Btu/lb/R		0.5056
Cv	Btu/lbmol/R		49.3271
Cv	Btu/lb/R		0.4424
Cp/Cv			1.1428
Density	lb/ft3		43.2796
Z-Factor			0.043502
Flowrate (T-P)	gal/min		12.1313
Flowrate (STP)	gal/min		11.9
Specific Gravity	GPA STP		0.707396
Viscosity	cP		0.495811
Thermal Conductivity	Btu/hr/ft/R		0.068329
Surface Tension	dyne/cm		19.1391
Reid Vapor Pressure (ASTM-A	psia		13.6
True Vapor Pressure at 100 F	psia		95.25
Critical Temperature (Cubic E	F	593.0848	
Critical Pressure (Cubic EOS)	psia	479.1639	
Dew Point Temperature	F	452.1604	
Bubble Point Temperature	F	107.7105	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	88.6915	
Latent Heat of Vaporization (N	Btu/lb	103.1429	
Latent Heat of Vaporization (P	Btu/lb	324.9526	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6065.23	
Heating Value (net)	Btu/SCF	5632.2	
Wobbe Number	Btu/SCF	2923.77	
Average Hydrogen Atoms		17.2137	
Average Carbon Atoms		7.8337	
Hydrogen to Carbon Ratio		2.1974	

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.017542	0.017542	0.00001649	0	0.834113	505.969
49 : CARBON DIOXIDE	0.037023	0.037023	0.000286	0	1.76039	61.6097
2 : METHANE	0.729743	0.729743	0.00179	0	34.6984	193.878
3 : ETHANE	0.501752	0.501752	0.00797	0	23.8577	29.9343
4 : PROPANE	0.426897	0.426897	0.026356	0	20.2984	7.70166
5 : ISOBUTANE	0.07158	0.07158	0.011336	0	3.40352	3.0023
6 : N-BUTANE	0.173708	0.173708	0.037404	0	8.25959	2.20818
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.045604	0.045604	0.028151	0	2.1684	0.770284
8 : N-PENTANE	0.04931	0.04931	0.039177	0	2.34465	0.598482
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.028557	0.028557	0.077003	0	1.35784	0.176335
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.001569	0.001569	0.004467	0	0.074591	0.166971
38 : CYCLOHEXANE	0.003189	0.003189	0.011305	0	0.151648	0.134139
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.009194	0.009194	0.082163	0	0.437172	0.053208
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.001727	0.001727	0.019267	0	0.082116	0.042619
12 : N-OCTANE	0.002418	0.002418	0.070016	0	0.114983	0.016422
45 : ETHYL BENZENE	0.000158	0.000158	0.004687	0	0.007493	0.015986
43 : M-XYLENE	0.000784	0.000784	0.027872	0	0.037259	0.013368
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.00069	0.00069	0.06317	0	0.032827	0.005197
14 : N-DECANE	0.001661	0.001661	0.487563	0	0.078988	0.00162
62 : WATER	0	0	0	0	0	0.024719
Total	2.10311	2.10311	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.491419	0.491419	0.000004	0	0.668823
49 : CARBON DIOXIDE	1.62933	1.62933	0.000108	0	2.21753
2 : METHANE	11.7073	11.7073	0.000248	0	15.9336
3 : ETHANE	15.0867	15.0867	0.002066	0	20.533
4 : PROPANE	18.8236	18.8236	0.01002	0	25.619
5 : ISOBUTANE	4.16021	4.16021	0.00568	0	5.66206
6 : N-BUTANE	10.0959	10.0959	0.01874	0	13.7406
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	3.29012	3.29012	0.01751	0	4.47787
8 : N-PENTANE	3.55755	3.55755	0.02437	0	4.84185
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	2.46079	2.46079	0.0572	0	3.34914
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.12253	0.12253	0.003008	0	0.166763
38 : CYCLOHEXANE	0.2684	0.2684	0.008202	0	0.365294
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.921238	0.921238	0.07097	0	1.25381
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.159114	0.159114	0.0153	0	0.216554
12 : N-OCTANE	0.276218	0.276218	0.06894	0	0.375934
45 : ETHYL BENZENE	0.016728	0.016728	0.004289	0	0.022767
43 : M-XYLENE	0.083187	0.083187	0.02551	0	0.113217
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.088541	0.088541	0.06984	0	0.120505
14 : N-DECANE	0.236348	0.236348	0.598	0	0.32167
62 : WATER	0	0	0	0	0
Total	73.4752	73.4752	1	0	100
	Total VOC	**44.560474**			

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	6.72135	6.72135	0	0	0.834113
49 : CARBON DIOXIDE	14.1854	14.1854	0	0	1.76039
2 : METHANE	279.602	279.602	0	0	34.6984
3 : ETHANE	192.247	192.247	0	0	23.8577
4 : PROPANE	163.566	163.566	0	0	20.2984
5 : ISOBUTANE	27.4258	27.4258	0	0	3.40352
6 : N-BUTANE	66.5565	66.5565	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	17.4731	17.4731	0	0	2.1684
8 : N-PENTANE	18.8934	18.8934	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	10.9416	10.9416	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.601058	0.601058	0	0	0.074591
38 : CYCLOHEXANE	1.22199	1.22199	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.52276	3.52276	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.661696	0.661696	0	0	0.082116
12 : N-OCTANE	0.926542	0.926542	0	0	0.114983
45 : ETHYL BENZENE	0.060376	0.060376	0	0	0.007493
43 : M-XYLENE	0.300236	0.300236	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.264521	0.264521	0	0	0.032827
14 : N-DECANE	0.636488	0.636488	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	**805.808**	**805.808**	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	6.657	6.657	0	0	0.834113
49 : CARBON DIOXIDE	14.0496	14.0496	0	0	1.76039
2 : METHANE	276.925	276.925	0	0	34.6984
3 : ETHANE	190.406	190.406	0	0	23.8577
4 : PROPANE	162	162	0	0	20.2984
5 : ISOBUTANE	27.1633	27.1633	0	0	3.40352
6 : N-BUTANE	65.9192	65.9192	0	0	8.25959
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	17.3058	17.3058	0	0	2.1684
8 : N-PENTANE	18.7125	18.7125	0	0	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	10.8368	10.8368	0	0	1.35784
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.595304	0.595304	0	0	0.074591
38 : CYCLOHEXANE	1.21029	1.21029	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.48904	3.48904	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.65536	0.65536	0	0	0.082116
12 : N-OCTANE	0.917671	0.917671	0	0	0.114983
45 : ETHYL BENZENE	0.059798	0.059798	0	0	0.007493
43 : M-XYLENE	0.297362	0.297362	0	0	0.037259
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.261988	0.261988	0	0	0.032827
14 : N-DECANE	0.630394	0.630394	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	798.093	798.093	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	1068.573	
Entropy	Btu/hr/R	9.486216	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	2.1031	2.1031
Flowrate	lb/hr	73.4752	73.4752
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		**34.9365**	**34.9365**
Enthalpy	Btu/lbmol	508.0927	508.0927
Enthalpy	Btu/lb	14.5433	14.5433
Entropy	Btu/lbmol/R	4.5106	4.5106
Entropy	Btu/lb/R	0.129108	0.129108
Cp	Btu/lbmol/R		14.5903
Cp	Btu/lb/R		0.4176
Cv	Btu/lbmol/R		12.534
Cv	Btu/lb/R		0.3588
Cp/Cv			1.1641
Density	lb/ft3		0.091182
Z-Factor			0.991021
Flowrate (T-P)	ft3/s		0.223836
Flowrate (STP)	MMSCFD		0.019154
Viscosity	cP		0.009578
Thermal Conductivity	Btu/hr/ft/R		0.012708
Critical Temperature (Cubic E	F	173.1526	
Critical Pressure (Cubic EOS)	psia	1347.8257	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-259.4223	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	1142.0302	
Vapor Sonic Velocity	ft/s	927.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1964.1	
Heating Value (net)	**Btu/SCF**	**1800.85**	
Wobbe Number	Btu/SCF	1778.4	
Average Hydrogen Atoms		6.4895	
Average Carbon Atoms		2.2979	
Hydrogen to Carbon Ratio		2.8241	
Methane Number		41.29	
Motor Octane Number		98.76	

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	NBS81	Liquid 2 ThC:	NBS81	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000588	0	0.000588	0	0.001649	
49 : CARBON DIOXIDE	0.010191	0	0.010191	0	0.028573	
2 : METHANE	0.063834	0	0.063834	0	0.17897	
3 : ETHANE	0.284271	0	0.284271	0	0.797002	
4 : PROPANE	0.94005	0	0.94005	0	2.63559	
5 : ISOBUTANE	0.40434	0	0.40434	0	1.13364	
6 : N-BUTANE	1.33413	0	1.33413	0	3.74045	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.00406	0	1.00406	0	2.81506	
8 : N-PENTANE	1.39733	0	1.39733	0	3.91766	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.74651	0	2.74651	0	7.7003	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.159337	0	0.159337	0	0.44673	
38 : CYCLOHEXANE	0.403231	0	0.403231	0	1.13053	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	2.93055	0	2.93055	0	8.21631	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.687223	0	0.687223	0	1.92675	
12 : N-OCTANE	2.49729	0	2.49729	0	7.00158	
45 : ETHYL BENZENE	0.16717	0	0.16717	0	0.468689	
43 : M-XYLENE	0.994115	0	0.994115	0	2.78717	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	2.25313	0	2.25313	0	6.31703	
14 : N-DECANE	17.3902	0	17.3902	0	48.7563	
62 : WATER	0	0	0	0	0	
Total	35.6675	0	35.6675	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.016472	0	0.016472	0	0.000398
49 : CARBON DIOXIDE	0.448511	0	0.448511	0	0.01084
2 : METHANE	1.02409	0	1.02409	0	0.024751
3 : ETHANE	8.54746	0	8.54746	0	0.206586
4 : PROPANE	41.4506	0	41.4506	0	1.00183
5 : ISOBUTANE	23.5002	0	23.5002	0	0.567984
6 : N-BUTANE	77.5394	0	77.5394	0	1.87407
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	72.4392	0	72.4392	0	1.7508
8 : N-PENTANE	100.812	0	100.812	0	2.43655
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	236.672	0	236.672	0	5.72019
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	12.4455	0	12.4455	0	0.300799
38 : CYCLOHEXANE	33.9343	0	33.9343	0	0.820168
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	293.636	0	293.636	0	7.09696
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	63.3166	0	63.3166	0	1.53032
12 : N-OCTANE	285.251	0	285.251	0	6.89431
45 : ETHYL BENZENE	17.7467	0	17.7467	0	0.428926
43 : M-XYLENE	105.535	0	105.535	0	2.55071
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	288.964	0	288.964	0	6.98405
14 : N-DECANE	2474.2	0	2474.2	0	59.7998
62 : WATER	0	0	0	0	0
Total	4137.48	0	4137.48	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.001541	0	0.001541	0	0.001649
49 : CARBON DIOXIDE	0.026703	0	0.026703	0	0.028573
2 : METHANE	0.167256	0	0.167256	0	0.17897
3 : ETHANE	0.744836	0	0.744836	0	0.797002
4 : PROPANE	2.46308	0	2.46308	0	2.63559
5 : ISOBUTANE	1.05944	0	1.05944	0	1.13364
6 : N-BUTANE	3.49563	0	3.49563	0	3.74045
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	2.63081	0	2.63081	0	2.81506
8 : N-PENTANE	3.66124	0	3.66124	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.19629	0	7.19629	0	7.7003
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.41749	0	0.41749	0	0.44673
38 : CYCLOHEXANE	1.05653	0	1.05653	0	1.13053
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.67852	0	7.67852	0	8.21631
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.80064	0	1.80064	0	1.92675
12 : N-OCTANE	6.54331	0	6.54331	0	7.00158
45 : ETHYL BENZENE	0.438012	0	0.438012	0	0.468689
43 : M-XYLENE	2.60474	0	2.60474	0	2.78717
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	5.90356	0	5.90356	0	6.31703
14 : N-DECANE	45.5651	0	45.5651	0	48.7563
62 : WATER	0	0	0	0	0
Total	93.4547	0	93.4547	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000327	0	0.000327	0	0.000353
49 : CARBON DIOXIDE	0.008749	0	0.008749	0	0.009425
2 : METHANE	0.05476	0	0.05476	0	0.05899
3 : ETHANE	0.384537	0	0.384537	0	0.41424
4 : PROPANE	1.30995	0	1.30995	0	1.41113
5 : ISOBUTANE	0.669385	0	0.669385	0	0.721091
6 : N-BUTANE	2.12875	0	2.12875	0	2.29318
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.85967	0	1.85967	0	2.00332
8 : N-PENTANE	2.56135	0	2.56135	0	2.7592
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	5.71513	0	5.71513	0	6.15659
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.225613	0	0.225613	0	0.24304
38 : CYCLOHEXANE	0.694501	0	0.694501	0	0.748147
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	6.84166	0	6.84166	0	7.37014
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.16452	0	1.16452	0	1.25448
12 : N-OCTANE	6.46981	0	6.46981	0	6.96956
45 : ETHYL BENZENE	0.32645	0	0.32645	0	0.351666
43 : M-XYLENE	1.94783	0	1.94783	0	2.09828
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	6.41886	0	6.41886	0	6.91468
14 : N-DECANE	54.0476	0	54.0476	0	58.2225
62 : WATER	0	0	0	0	0
Total	92.8295	0	92.8295	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	-575446.1	
Entropy	Btu/hr/R	-639.7209	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	35.6675	35.6675
Flowrate	lb/hr	4137.4836	4137.4836
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		116.0014	116.0014
Enthalpy	Btu/lbmol	-16133.6115	-16133.6115
Enthalpy	Btu/lb	-139.0812	-139.0812
Entropy	Btu/lbmol/R	-17.9357	-17.9357
Entropy	Btu/lb/R	-0.154616	-0.154616
Cp	Btu/lbmol/R		57.4199
Cp	Btu/lb/R		0.495
Cv	Btu/lbmol/R		50.5021
Cv	Btu/lb/R		0.4354
Cp/Cv			1.137
Density	lb/ft3		44.2726
Z-Factor			0.006777
Flowrate (T-P)	gal/min		11.6522
Flowrate (STP)	gal/min		11.5735
Specific Gravity	GPA STP		0.714658
Viscosity	cP		0.515961
Thermal Conductivity	Btu/hr/ft/R		0.065866
Surface Tension	dyne/cm		21.2374
Reid Vapor Pressure (ASTM-A	**psia**		**11.05**
True Vapor Pressure at 100 F	psia		19.47
Critical Temperature (Cubic E	F	599.2774	
Critical Pressure (Cubic EOS)	psia	431.1843	
Dew Point Temperature	F	308.9403	
Bubble Point Temperature	F	69.9748	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.9117	
Latent Heat of Vaporization (P	Btu/lb	259.9742	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6307.05	
Heating Value (net)	Btu/SCF	5858.11	
Wobbe Number	Btu/SCF	2964.64	
Average Hydrogen Atoms		17.8461	
Average Carbon Atoms		8.1601	
Hydrogen to Carbon Ratio		2.187	

ATTACHMENT 4
QUALIFICATION FOR PERMIT BY RULE

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 4
QUALIFICATION FOR PERMIT BY RULE

Jo Ann Esse Unit F1
(Referred to as "the Site")
Located in Live Oak County

Burlington Resources Oil & Gas Company LP (Burlington Resources) is submitting this registration to authorize three (3) controlled atmospheric condensate storage tanks and associated loading, one (1) controlled atmospheric produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. This attachment discusses how the Site will meet the general Permit By Rule (PBR) requirements codified in Title 30 of the Texas Administrative Code (30 TAC) §106.4 and the specific PBR requirements codified in 30 TAC §106.352 and 30 TAC §106.492. Copies of these PBR rules are located in Attachment 5 of this PBR registration.

30 TAC §106.4, effective May 15, 2011

30 TAC §106.4(a)(1)

This paragraph states that total actual emissions authorized under permit by rule from the facility shall not exceed 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_X); or 25 tpy of volatile organic compounds (VOC) or sulfur dioxide (SO_2) or inhalable particulate matter (PM); or 15 tpy of particulate matter with diameters of 10 microns or less (PM_{10}); or 10 tpy of particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$); or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.

The Site's potential emission rates are as follows:

- **CO: 10.17 T/yr**
- **NO_X: 5.08 T/yr**
- **$PM/PM_{10}/PM_{2.5}$: 0.00 T/yr**
- **SO_2: 1.15 T/yr**
- **VOC: 12.81 T/yr**
- **H_2S: 0.02 T/yr**

As shown above, the Site will meet the requirements of this rule.

30 TAC §106.4(a)(2)

This rule requires a project that constitutes a new major stationary source or major modification under the new source review requirements of the Federal Clean Air Act (FCAA), Part D (Nonattainment), to obtain a permit in accordance with Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and prohibits such a project from qualifying for PBR.

The Site is located in Live Oak County , which is classified as attainment; therefore, this rule does not apply.

30 TAC §106.4(a)(3)

This rule requires a project that constitutes a new major stationary source or major modification, as defined in 40 Code of Federal Regulations (CFR) §52.21, under the new source review requirements of the Federal Clean Air Act (FCAA), Part C (Prevention of Significant Deterioration [PSD]), to obtain a permit in accordance with Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and prohibits such a project from qualifying for PBR.

The Site will not be a new major source as that term is defined in 40 CFR §52.21. Therefore, this rule does not apply.

30 TAC §106.4(a)(4)

This rule limits the total actual emissions from all PBR facilities at the site to 250 T/yr of CO or NO_X and 25 T/yr of VOC, SO_2, PM_{10}, or 25 T/yr of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen unless at least one facility at the account has been subject to public notification and comment as required in Chapter 116, Subchapter B or Subchapter D.

The potential emissions associated with the Site will be below these limitations. Therefore, the requirements of this rule will be met.

30 TAC §106.4(a)(5)

This rule requires that a Project comply with the version of the PBR that is effective on the date that construction commences.

This PBR registration document addresses the Site's compliance with the most recent versions of 30 TAC §106.4, §106.352, and §106.492. If another version of any of these PBR sections becomes effective before the commencement of construction on the Project, the Site will comply with that version of the PBR section(s).

30 TAC §106.4(a)(6)

This rule requires that a Project comply with all applicable provisions of the FCAA, §111 (New Source Performance Standards [NSPS]) and §112 (Hazardous Air Pollutants [HAPs]), and the new source review requirements of the FCAA, Part C and Part D and regulations promulgated there under.

As stated previously, the Site will not be a major source and does not trigger Nonattainment or PSD permitting requirements.

30 TAC §106.4(a)(7)

This rule prohibits the use of a PBR when there is a permit condition precluding the use of the PBR.

The Site does not have an associated air permit prohibiting the use of a PBR. Therefore, this rule does not apply.

30 TAC §106.4(a)(8)

This rule contains requirements for facilities in the Houston/Galveston nonattainment area.

The Site will not be located in the Houston/Galveston nonattainment area; therefore, this rule does not apply.

30 TAC §106.4(b)

This rule prohibits circumventing the permitting requirements of Chapter 116 by artificial limitations.

The emission rates for the Site's sources are estimated based upon the anticipated maximum operating configuration. Therefore, Burlington Resources is not taking artificial limitations to avoid permitting under Chapter 116.

30 TAC §106.4(c)

This rule requires that the facility comply with all rules and regulations of the commission and with the intent of the TCAA, including protection of health and property of the public, and that all emissions control equipment shall be maintained in good condition and operated properly during operation of the facility.

The Site will be operated in compliance with the applicable state and federal air rules. Specifically, the requirements in 30 TAC §115 and §117.

30 TAC §106.4(d)

This rule requires that the Project be registered with or permitted by any local air pollution control agency with jurisdiction.

The Site is located in an area that does not have a local air regulatory agency. Therefore, this rule does not apply.

30 TAC §106.352, effective February 27, 2011

30 TAC §106.352(a)(1)

This rule requires that projects located in the Barnett Shale for which construction started on or after April 1, 2011 meet the requirements in subsections (a) – (k) of this rule. All other projects which started construction between February 27, 2011 and April 1, 2011, or sites not located in the Barnett Shale, are required to meet the requirements in subsection (l) of this rule.

The Site is not located in the Barnett Shale counties listed in this paragraph. Therefore, the Site will meet the requirements of this rule by meeting the requirements in subsection (l).

30 TAC §106.352(i)(1)

This rule states that prior to January 5, 2012, representations and registration of planned MSS is voluntary, but if represented must meet the applicable limits of this section. After January 5, 2012, all emissions from planned MSS activities and facilities must be considered for compliance with applicable limits of this section. This section may not be used at a site or for facilities authorized under §116.111 of this title if planned MSS has already been authorized under that permit.

Burlington Resources has voluntarily represented planned MSS emissions at this time, rather than the delayed compliance date in 2014, and will comply with the requirements of this rule.

30 TAC §106.352(i)(2)

This rule states that releases of air contaminants during, or as result of, planned MSS must be quantified and meet the emission limits in this section, as applicable. This analysis must include:

(A) alternate operational scenarios or redirection of vent streams;
(B) pigging, purging, and blowdowns;
(C) temporary facilities if used for degassing or purging of tanks, vessels, or other facilities;
(D) degassing or purging of tanks, vessels, or other facilities; and,
(E) management of sludge from pits, ponds, sumps, and water conveyances.

This submittal includes emissions representations for alternate operational scenarios during maintenance events. The first scenario occurs when the well is shut in and not producing so that the flare on site may be taken down for maintenance. Emissions related to the standing losses of the liquids already in the storage tanks at the time of shut in are represented in this application as an MSS event. Working losses and flash emissions will not occur as the liquid levels would not be changing.

The second scenario occurs when engines located at sites downstream from this one go down for maintenance. This site would in turn send all low pressure gas from the separator to flare. The proposed site emissions include this maintenance event and the resulting combustion emissions.

All other MSS activities listed in this rule do not apply to the Site.

30 TAC §106.352(i)(3)

This rule states all planned MSS activities authorized by this section. These planned MSS activities require only recordkeeping of the activity.

Burlington Resources will keep records in accordance with this rule.

30 TAC §106.352(i)(4)

This rule states that engine and compressor startups associated with preventative system shutdown activities have the option to be authorized as part of typical operations if:

> (A) prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with all supporting documentation;
> (B) engine/compressor shutdowns shall result in no greater than 4 lb/hr of natural gas emissions; and
> (C) emissions which result from the subsequent compressor startup activities are controlled to a minimum of 98% efficiency for VOC and H_2S.

This site does not include compressor engines. Therefore, this rule does not apply.

30 TAC §106.352(l)

This rule requires that the site handles gas containing less than two long tons per day of sulfur compounds.

The gas contains less than two long tons per day of sulfur and meets the requirements of this rule.

30 TAC §106.352(l)(1)

This rule requires that compressors and flares meet the requirements of §106.492 and §106.512.

This Site has one flare. As shown on later pages, this facility will meet the requirements listed in §106.492.

30 TAC §106.352(l)(2)

This requirement limits the total emissions from the sources authorized under this PBR, including process fugitives, combustion unit stacks, separator, or other process vents, tank vents, and loading emissions from all such facilities to 25 T/yr each of sulfur dioxide (SO_2), all other sulfur compounds, and VOC and 250 T/yr each of NO_X and CO. Emissions of VOC and sulfur compounds other than SO_2 must include gas lost by equilibrium flash as well as gas lost by conventional evaporation.

As stated previously, the emissions associated with this PBR registration are as follows:

- **CO: 10.17 T/yr**
- **NO_X: 5.08 T/yr**
- **$PM/PM_{10}/PM_{2.5}$: 0.00 T/yr**
- **SO_2: 1.15 T/yr**
- **VOC: 12.81 T/yr**
- **H_2S: 0.02 T/yr**

As shown above, the Site will meet the requirements of this rule.

30 TAC §106.352(l)(3)

This rule limits total emissions of sulfur compounds, excluding sulfur oxides, from all vents to 4.0 pounds per hour (lb/hr). This rule also contains stack height requirements for vents emitting sulfur compounds, excluding sulfur oxides.

The Site's total emissions of sulfur compounds will be less than 4.0 pounds per hour (lb/hr). Therefore, the requirement of this rule will be met.

30 TAC §106.352(l)(4)

This rule requires that a TCEQ Form PI-7 and associated documentation be submitted to the TCEQ before operation begins at a facility handling sour gas or a temporary facility.

The Site handles sour gas. A TCEQ form PI-7-CERT and associated documentation are being submitted to the TCEQ for registration before operation begins. Therefore, the requirements of this rule have been met.

30 TAC §106.492, effective September 4, 2000

30 TAC §106.492(1)(A)

This rule requires the flare shall be equipped with a flare tip designed to provide good mixing with air, flame stability, and a tip velocity less than 60 feet per second (ft/sec) for gases having a lower heating value less than 1,000 British thermal units per cubic foot (Btu/ft^3) or a tip velocity less than 400 ft/sec for gases having a lower heating value greater than 1,000 Btu/ft^3.

The flare tip will be designed to provide good mixing with air, flame stability, and will have a tip velocity of less than 400 ft/sec (maximum calculated velocity of 398.2 ft/sec). The waste gasses and fuel gasses will have a lower heating value greater than 1,000 Btu/ft^3. Therefore, the maximum calculated velocity will meet the requirements of this rule.

30 TAC §106.492(1)(B)

This rule requires the flare shall be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification of appropriate personnel when the ignition system ceases to function. A gas flare which emits no more than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides, is exempted from the immediate notification requirement, provided the emission point height meets the requirements of §106.352(4) of this title (relating to Oil and Gas Production Facilities).

The flare will be equipped with a continuously burning pilot light or other automatic ignition system that assures gas ignition and provides immediate notification when the system ceases to function. The flare will emit less than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides. Therefore, the requirements of this rule have been met.

30 TAC §106.492(1)(C)

This rule requires a flare which burns gases containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located.

This flare burns gasses containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element, it is located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located. Therefore, the requirements of this rule have been met.

30 TAC §106.492(1)(D)

This rule requires the heat release of a flare which emits sulfur dioxide (SO_2) or hydrogen chloride (HCl) shall be greater than or equal to the values identified in this rule.

The flare is not expected to emit hydrogen chloride. During the SMSS events, the heat release of the flare is 83.07 MMBtu/hr and the heat release predicted by the equation is 0.14363 MMBtu/hr. During normal operations the heat release of the flare is 6.94 MMBtu/hr and the heat release predicted by the equation is 0.001071 MMBtu/hr. Therefore, in both scenarios the heat release will be greater than the requirement identified in this rule and the requirements of this rule have been met.

30 TAC §106.492(2)(A)

This rule requires the flare to burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. When the gas stream to be burned has a net or lower heating value of more than 200 Btu/ft^3 prior to the addition of air, it may be considered combustible.

The flare will burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. The heating value of the gas is estimated to be 1235 Btu/scf or higher, depending on the waste gas stream sent to flare at the moment. Therefore, the requirements of this rule have been met.

30 TAC §106.492(2)(B)

This rule requires a flare that burns gases containing more than 24 ppmv of sulfur, chlorine, or compounds containing either element shall be registered with the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7 prior to construction of a new flare or prior to the use of an existing flare for the new service.

A form PI-7 CERT and supporting documentation is being submitted prior to construction in accordance with this rule. Therefore, the requirements of this rule have been met.

30 TAC §106.492(2)(C)

This rule requires that under no circumstances shall liquids be burned in the flare.

Liquids will not be burned with this flare. Therefore, the requirements of this rule have been met.

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

Electronic Submittal - Only enter the PI-7 confirmation number here ______ if submitting electronically.
Hard-Copy Submittal - Print and complete this checklist.

The following checklist was developed by the Texas Commission on Environmental Quality (TCEQ), **Air Permits Division**, to assist applicants in determining whether or not a facility meets all of the applicable requirements. Before claiming a specific Permit by Rule (PBR), a facility must first meet all of the requirements of **Title 30 Texas Administrative Code § 106.4** (30 TAC § 106.4), "Requirements for Permitting by Rule." Only then can the applicant proceed with addressing requirements of the specific Permit by Rule being claimed.

The use of this checklist is not mandatory; however, it is the responsibility of each applicant to show how a facility being claimed under a PBR meets the general requirements of 30 TAC § 106.4 and also the specific requirements of the PBR being claimed. If all PBR requirements cannot be met, a facility will not be allowed to operate under the PBR and an application for a construction permit may be required under 30 TAC § 116.110(a).

Registration of a facility under a PBR can be performed by completing **Form PI-7** (Registration for Permits by Rule) or **Form PI-7-CERT** (Certification and Registration for Permits by Rule). The appropriate checklist should accompany the registration form. Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the question number. The PBR forms, tables, checklists and guidance documents are available from the TCEQ, Air Permits Division Web site at: **www.tceq.state.tx.us/permitting/air/nav/air_pbr.html**.

1. 30 TAC § 106.4(a)(1) & (4): Emission limits	
List emissions in tpy for **each** facility (add additional pages or table if needed): SO_2 = ___ PM_{10} = ___ VOC = ___ NO_x = ___ CO = ___ Other H2S = ___ SO_2 = ___ PM_{10} = ___ VOC = ___ NO_x = ___ CO = ___ Other ___ = ___ SO_2 = ___ PM_{10} = ___ VOC = ___ NO_x = ___ CO = ___ Other ___ = ___ **Total** 1.15 0.00 12.81 5.08 10.17 0.02	See Table 3-1 for Individual Facilities
• Are the SO_2, PM_{10}, VOC, or other air contaminant emissions claimed for **each** facility in this PBR submittal less than 25 tpy? • Are the NO_x and CO emissions claimed for each facility in this PBR submittal less than 250 tpy? *If the answer to both is "Yes," continue to the question below. If the answer to either question is "No," a* ***PBR cannot be claimed.***	☑YES ☐NO ☑YES ☐NO
Has any facility at the property had public notice and opportunity for comment under 30 TAC Section 116 for a regular permit or permit renewal? (This does not include public notice for voluntary emission reduction permits, grandfathered existing facility permits, or federal operating permits.) *If "Yes," skip to Section 2. If "No," continue to the questions below.*	☐YES ☑NO
If the site has had no public notice, please answer the following: • Are the SO_2, PM_{10}, VOC, or other emissions claimed for **all** facilities in this PBR submittal less than 25 tpy? • Are the NO_x and CO emissions claimed for all facilities in this PBR submittal less than 250 tpy? *If the answer to both questions is "Yes," continue to Section 2.* *If the answer to either question is "No,"* ***a PBR cannot be claimed****. A permit will be required under Chapter 116.*	☑YES ☐NO ☑YES ☐NO
2. 30 TAC § 106.4(a)(2): Nonattainment check	
Are the facilities to be claimed under this PBR located in a designated ozone nonattainment county? *If "Yes," please indicate which county by checking the appropriate box to the right.* (Marginal) - Hardin, Jefferson, and Orange counties *(BPA)* (Moderate) - Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties *(HGA)* (Moderate) - Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties *(DFW)* *If "Yes," to any of the above, continue to the next question. If "No," continue to Section 3.*	☐YES ☑NO ☐BPA ☐HGA ☐DFW

Does this project trigger a nonattainment review? To determine the answer, review the information below: • Is the project's potential to emit (PTE) for emissions of VOC or NO_x increasing by 100 tpy or more? *PTE is the maximum capacity of a stationary source to emit any air pollutant under its worst-case physical and operational design unless limited by a permit, rule, or made federally enforceable by a certification.* • Is the site an existing major nonattainment site and are the emissions of VOC or NO_x increasing by 40 tpy or more? If needed, attach contemporaneous netting calculations per nonattainment guidance. Additional information can be found at: **www.tceq.state.tx.us/permitting/air/forms/newsourcereview/tables/nsr_table8.html** and **www.tceq.state.tx.us/permitting/air/nav/air_docs_newsource.html** If checklist is submitted as a hard copy, attach additional pages as needed. If checklist is submitted electronically, please email attachment to the following address: **apd@tceq.state.tx.us** *If "Yes," to any of the above, the project is a major source or a major modification and **a PBR may not be used.** A Nonattainment Permit review must be completed to authorize this project. If "No," continue to Section 3.*	☐YES ☐NO ☐YES ☐NO
3. 30 TAC § 106.4(a)(3): Prevention of Significant Deterioration (PSD) check	
Does this project trigger a review under PSD rules? To determine the answer, review the information below: • Are emissions of any regulated criteria pollutant increasing by 100 tpy of any criteria pollutant at a named source? • Are emissions of any criteria pollutant increasing by 250 tpy of any criteria pollutant at an unnamed source? • Are emissions increasing above significance levels at an existing major site? PSD information can be found at: **www.tceq.state.tx.us/permitting/air/forms/newsourcereview/tables/nsr_table9.html** and **www.tceq.state.tx.us/permitting/air/nav/air_docs_newsource.html** *If "Yes," to any of the above, **a PBR may not be used.** A PSD Permit review must be completed to authorize the project. If "No," continue to Section 4.*	☐YES ☑NO ☐YES ☑NO ☐YES ☑NO
4. 30 TAC § 106.4(a)(6): Federal Requirements	
• Will all facilities under this PBR meet applicable requirements of Title 40 Code of Federal Regulations (40 CFR) Part 60, New Source Performance Standards (NSPS)? If "Yes," which Subparts are applicable?: ________ • Will all facilities under this PBR meet applicable requirements of 40 CFR Part 63, Hazardous Air Pollutants Maximum Achievable Control Technology (MACT) standards? If "Yes," which Subparts are applicable?: ________ • Will all facilities under this PBR meet applicable requirements of 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPs)? If "Yes," which Subparts are applicable?: ________ If checklist is submitted as a hard copy, attach additional pages as needed. If checklist is submitted electronically, please email attachment to the following address: **apd@tceq.state.tx.us** *If "Yes" to any of the above, please attach a discussion of how the facilities will meet any applicable standards.*	☐YES ☐NO ☑N/A ☐YES ☐NO ☑N/A ☐YES ☐NO ☑N/A
5. 30 TAC § 106.4(a)(7): PBR prohibition check	
Are there any air permits at the site containing conditions which prohibit or restrict the use of PBRs? *If "Yes," PBRs may not be used or their use must meet the restrictions of the permit. A new permit or permit amendment may be required.* ***List permit number(s):*** N/A *If "No," continue to Section 6.*	☐YES ☑NO

6. 30 TAC § 106.4(a)(8): NO_x Cap and Trade	
• Is the facility located in Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County? *If "Yes," answer the question below. If "No," continue to Section 7.*	☐YES ☑NO
• Will the proposed facility or group of facilities obtain required allowances for NO_x if they are subject to 30 TAC Chapter 101, Subchapter H, Division 3 (relating to the Mass Emissions Cap and Trade Program)?	☐YES ☐NO
7. Highly Reactive Volatile Organic Compounds (HRVOC) check	
• Is the facility located in Harris County? *If "Yes," answer the next question. If "No," skip to the box below.*	☐YES ☑NO
• Will the project be constructed after June 1, 2006? *If "Yes," answer the next question. If "No," skip to the box below.*	☐YES ☐NO
• Will one or more of the following HRVOC be emitted as a part of this project?	☐YES ☐NO
If "Yes," complete the information below: lb/hr ___ tpy ___ ▸ 1,3-butadiene ___ ___ ▸ all isomers of butene (e.g., isobutene [2-methylpropene or isobutylene]) ___ ___ ▸ alpha-butylene (ethylethylene) ___ ___ ▸ beta-butylene (dimethylethylene, including both cis- and trans-isomers) ___ ___ ▸ ethylene ___ ___ ▸ propylene ___ ___	
• Is the facility located in Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County? *If "Yes," answer the next question. If "No," the checklist is complete.*	☐YES ☑NO
• Will the project be constructed after June 1, 2006? *If "Yes," answer the next question. If "No," the checklist is complete.*	☐YES ☐NO
• Will one or more of the following HRVOC be emitted as a part of this project?	☐YES ☐NO
If "Yes," complete the information below: lb/hr ___ tpy ___ ▸ ethylene ___ ___ ▸ propylene ___ ___	

Oil and Gas Handling and Production Facilities
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Check the most appropriate answer and include any technical information in the spaces provided. If additional space is needed, please include an extra page that references this checklist. The forms, checklists, and guidance documents are available from the Texas Commission on Environmental Quality (TCEQ), Air Permits Division Web site at: **www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html**. If you have any questions, or need additional assistance, please contact the Air Permits Division at (512) 239-1250.

The facility can register by submitting this application and any supporting documentation. Below is a checklist to ensure you have provided all appropriate documentation. For sites that require registration or if the company chooses to register the site with the TCEQ, a Core Data Form is required with this checklist.

I.	**This checklist is for use by the operator to ensure a complete application.**	
1.	Have you included each of the following items in the application?	
☒	Process Description.	
☒	Plot plan or area map.	
☒	TCEQ Oil and Gas Emission Calculation Spreadsheet (or equivalent).	
☒	Detailed summary of maximum emissions estimates with supporting documentation, such as result reports from any emission estimation computer program.	
☒	Gas and Liquid analyses. If a site specific analysis is not submitted, please provide justification as to why a representative site was used.	
☒	Technical documents (manufacturer's specification sheet, operational design sheets)	
☒	State and Federal applicability.	
☒	Core Data Form (for new sites that have never been registered with the TCEQ).	
II.	**General Information and Questions/Descriptions**	
1.	Is the project located in one of the Barnett Shale counties and did the start of construction or modification begin on or after April 1, 2011? Counties included in the Barnett Shale area: Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise counties. For what is considered start of construction see: www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/factsheet-const.pdf ***If "Yes," do not complete this checklist. The project is subject to the requirements of §106.352(a)-(k). Additional information for Barnett Shale area projects can be found at:* www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html.**	☐ Yes ☒ No
2.	Are the total site-wide emissions from all facilities claimed under §106.352 less than 25 tpy VOC, 250 tpy NOx, 250 tpy CO, and 25 tpy SO_2?	☒ Yes ☐ No

Oil and Gas Handling and Production Facilities
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II.	General Information and Questions/Descriptions *(continued)*	
3.	Does any facility at the site handle a stream with more than 24 ppm hydrogen sulfide (H_2S)? *If "Yes," answer the following questions.*	☒ Yes ☐ No
4.	Are there flares, engines, or turbines at the site? *If "Yes," attach supporting documentation to demonstrate compliance with the requirements.* ***Additional information and checklists can be found at:*** *§106.492 Flares:* www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-v/flares.html *§106.512 Stationary Engines and turbines:* www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-w/stationary_eng_turb.html	☒ Yes ☐ No
5.	Does any facility at the site handle a stream with more than 24 ppm hydrogen sulfide (H_2S)? ***If "Yes," answer the following questions. Registration is required prior to the start of operation.*** *If "No," skip questions 6 through 8.*	☒ Yes ☐ No
6.	Indicate the actual distance from the nearest emissions point to the nearest offsite receptor. An offsite receptor includes any recreational area, residence, or other structure not occupied or used solely by the owner or operator of the facility. A facility handling sour gas must be located at least 1/4 mile from the nearest offsite receptor.	>4700 feet
7.	Indicate the total actual emission rate of sulfur compounds, excluding sulfur oxides, from all vents.	0.0608 lb/hr
8.	Does the height of all vents at the site emitting sulfur compounds meet the minimum required height based on the H_2S emission rate in 106.352(l)(4)? Note: Truck loading and fugitive sources are not considered vents.	>20 feet

Recordkeeping: To demonstrate compliance with the requirements of the PBR, sufficient records must be maintained at all times. The records must be made available immediately upon request to the commission or any air pollution control program having jurisdiction. If you have any questions about the recordkeeping requirements, contact the Air Permits Division or the Air Program in the TCEQ Regional Office for the region in which the site is located.

Exemption §106.492 Checklist
(Previously Standard Exemption 80)

Smokeless Gas Flares

YOU MUST SUBMIT A PI-7 WITH REQUIRED ATTACHMENTS BEFORE CONSTRUCTION OR OPERATION IF THE GAS BURNED IN THE FLARE HAS A SULFUR OR CHLORINE CONCENTRATION GREATER THAN 24 PPMV.

The following checklist is designed to help you confirm that you meet Exemption §106.492, previously standard exemption 80, requirements. **Any "no" answers indicate that the claim of exemption may not meet all requirements for the use of Exemption §106.492, previously standard exemption 80.** If you do not meet all the requirements, you may alter the project design/operation in such a way that all the requirements of the exemption are met, or obtain a construction permit.

YES	NO	NA	DESCRIPTION
✓	_	_	Have you included a description of how this exemption claim meets the general rule for the use of exemptions (§106.4 checklist is available)?
✓	_	_	Is the flare equipped with a tip designed to provide good mixing with air, flame stability and a tip velocity less than 60 ft/sec for gases having a lower heating value less than 1,000 BTU/ft^3, or less than 400 ft/sec for gases with a LHV greater than 1,000 BTU/ft^3? Attach a description including BTU content and tip velocity (Table 8 is available).
✓	_	_	Is the flare equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition whenever vents are directed to the flare? Attach a description of the system.
_	_	✓	If the flare emits more than 4 #/hr of reduced sulfur compounds, excluding sulfur oxides, is it equipped with an alarm system that immediately notifies appropriate personnel when the ignition system ceases functioning? Attach a description of the system.
✓	_	_	If the flare emits less than 4 #/hr of reduced sulfur compounds and is not equipped with an alarm system, does the stack height meet the requirements of condition (d) of §106.352, previously standard exemption STDX 66? Required height: 30. Actual height 30.
✓	_	_	If the flare burns gases containing more than 24 ppmv of sulfur, chlorine or compounds containing either element, is it located at least 1/4 mile from any recreational area, residence, or other structure not occupied or used solely by the owner or operator of the flare or owner of the property where the flare is located? Attach a scaled map.
_	_	✓	If the flare emits HCl, does the heat release (BTU/hr based on lower heating value) equal or exceed 2.73 x 10E5 x HCl emission rate(lb/hr)? Attach calculations.
✓	_	_	If the flare emits SO2, does the heat release (BTU/hr based on lower heating value) equal or exceed 0.53 x 10E5 x SO2 emission rate (lb/hr)? Attach calculations.
✓	_	_	Will you limit the flare to burning only combustible mixtures of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements?
✓	_	_	Will the gas mixture always have a net or lower heating value of at least 200 BTU/ft3 prior to addition of air?
✓	_	_	Do you understand and will you ensure that liquids shall never be burned in the flare?

ATTACHMENT 5
SUPPORTING DOCUMENTATION

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

SUBCHAPTER A: GENERAL REQUIREMENTS
§§106.1, 106.2, 106.4, 106.6, 106.8, 106.13
Effective May 15, 2011

§106.1. Purpose.

This chapter identifies certain types of facilities or changes within facilities which the commission has determined will not make a significant contribution of air contaminants to the atmosphere pursuant to the Texas Health and Safety Code, the Texas Clean Air Act (TCAA), §382.057 and §382.05196.

Adopted August 9, 2000 Effective September 4, 2000

§106.2. Applicability.

This chapter applies to certain types of facilities or changes within facilities listed in this chapter where construction is commenced on or after the effective date of the relevant permit by rule.

Adopted August 9, 2000 Effective September 4, 2000

§106.4. Requirements for Permitting by Rule.

(a) To qualify for a permit by rule, the following general requirements must be met.

(1) Total actual emissions authorized under permit by rule from the facility shall not exceed 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_X); or 25 tpy of volatile organic compounds (VOC) or sulfur dioxide (SO_2) or inhalable particulate matter (PM); or 15 tpy of particulate matter with diameters of 10 microns or less (PM_{10}); or 10 tpy of particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$); or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.

(2) Any facility or group of facilities, which constitutes a new major stationary source, as defined in §116.12 of this title (relating to Nonattainment and Prevention of Significant Deterioration Review Definitions), or any modification which constitutes a major modification, as defined in §116.12 of this title, under the new source review requirements of the Federal Clean Air Act (FCAA), Part D (Nonattainment) as amended by the FCAA Amendments of 1990, and regulations promulgated thereunder, must meet the permitting requirements of Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and cannot qualify for a permit by rule under

this chapter. Persons claiming a permit by rule under this chapter should see the requirements of §116.150 of this title (relating to New Major Source or Major Modification in Ozone Nonattainment Areas) to ensure that any applicable netting requirements have been satisfied.

(3) Any facility or group of facilities, which constitutes a new major stationary source, as defined in 40 Code of Federal Regulations (CFR) §52.21, or any change which constitutes a major modification, as defined in 40 CFR §52.21, under the new source review requirements of the FCAA, Part C (Prevention of Significant Deterioration) as amended by the FCAA Amendments of 1990, and regulations promulgated thereunder, must meet the permitting requirements of Chapter 116, Subchapter B of this title and cannot qualify for a permit by rule under this chapter.

(4) Unless at least one facility at an account has been subject to public notification and comment as required in Chapter 116, Subchapter B or Subchapter D of this title (relating to New Source Review Permits or Permit Renewals), total actual emissions from all facilities permitted by rule at an account shall not exceed 250 tpy of CO or NO_X; or 25 tpy of VOC or SO_2 or PM ; or 15 tpy of PM_{10}; or 10 tpy of $PM_{2.5}$; or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.

(5) Construction or modification of a facility commenced on or after the effective date of a revision of this section or the effective date of a revision to a specific permit by rule in this chapter must meet the revised requirements to qualify for a permit by rule.

(6) A facility shall comply with all applicable provisions of the FCAA, §111 (Federal New Source Performance Standards) and §112 (Hazardous Air Pollutants), and the new source review requirements of the FCAA, Part C and Part D and regulations promulgated thereunder.

(7) There are no permits under the same commission account number that contain a condition or conditions precluding the use of a permit by rule under this chapter.

(8) The proposed facility or group of facilities shall obtain allowances for NO_X if they are subject to Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program).

(b) No person shall circumvent by artificial limitations the requirements of §116.110 of this title (relating to Applicability).

(c) The emissions from the facility shall comply with all rules and regulations of the commission and with the intent of the Texas Clean Air Act (TCAA), including protection of health and property of the public, and all emissions control equipment shall be maintained in good condition and operated properly during operation of the facility.

(d) Facilities permitted by rule under this chapter are not exempted from any permits or registrations required by local air pollution control agencies. Any such requirements must be in accordance with TCAA, §382.113 and any other applicable law.

Adopted April 20,2011 Effective May 15, 2011

§106.6. Registration of Emissions.

(a) An owner or operator may certify and register the maximum emission rates from facilities permitted by rule under this chapter in order to establish federally-enforceable allowable emission rates which are below the emission limitations in §106.4 of this title (relating to Requirements for Permitting by Rule).

(b) All representations with regard to construction plans, operating procedures, and maximum emission rates in any certified registration under this section become conditions upon which the facility permitted by rule shall be constructed and operated.

(c) It shall be unlawful for any person to vary from such representation if the change will cause a change in the method of control of emissions, the character of the emissions, or will result in an increase in the discharge of the various emissions, unless the certified registration is first revised.

(d) The certified registration must include documentation of the basis of emission estimates and a written statement by the registrant certifying that the maximum emission rates listed on the registration reflect the reasonably anticipated maximums for operation of the facility.

(e) Certified registrations used to demonstrate that Chapter 122 of this title (relating to Federal Operating Permits) does not apply to a source shall be submitted on the required form to the executive director; to the appropriate commission regional office; and to all local air pollution control agencies having jurisdiction over the site.

(1) Certified registrations established prior to the effective date of this rule shall be submitted on or before February 3, 2003.

(2) Certified registrations established on or after the effective date of this rule shall be submitted no later than the date of operation.

SUBCHAPTER O: OIL AND GAS
§§106.351 - 106.355
Effective February 27, 2011

§106.351. Salt Water Disposal (Petroleum).

Salt water disposal facilities used to handle aqueous liquid wastes from petroleum production operations and water injection facilities are permitted by rule, provided that the following conditions of this section are met.

(1) Any facility processing salt water which emits a sour gas shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the facility or the owner of the property upon which the facility is located.

(2) Any open storage of salt water shall be operated in such a manner as to prevent the occurrence of a nuisance condition off-property.

(3) All plant roads and truck loading and unloading areas must be operated and/or maintained as necessary to prevent dust emissions from the property which would cause or contribute to a nuisance condition. Appropriate operating activities may include reduction of speed of vehicles, use of alternate routes, and covering of dust-producing loads being hauled. Appropriate maintenance activities may include watering, treatment with dust suppressant chemicals, oiling, paving, and cleaning dust-producing surfaces.

(4) Before construction of the facility begins under this section, registration of the permit by rule shall be submitted to the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7, unless one of the following exceptions applies:

(A) all delivery of salt water to the site takes place through enclosed hoses or lines, and all storage and handling of salt water takes place in enclosed conduits, vessels, and storage, so that the salt water is not exposed to the atmosphere; or

(B) delivery of salt water from outside a site to all facilities at a site in any calendar day does not exceed 540,000 gallons.

Adopted August 9, 2000 Effective September 4, 2000

§106.352. Oil and Gas Handling and Production Facilities.

(a) Applicability. This section applies to all stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water with the following conditions:

(1) The requirements in subsections (a) - (k) of this section are applicable only for new projects and related facilities located in the Barnett Shale (Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise Counties) on or after April 1, 2011. For all other new projects and related facilities in all other counties of the state, subsection (l) of this section is applicable.

(2) Only one Oil and Gas Handling and Production Facilities permit by rule (PBR) for an oil and gas site (OGS) may be claimed or registered for each combination of dependent facilities and authorizes all facilities in sweet or sour service. This section may not be used if operationally dependent facilities are authorized by the Air Quality Standard Permit for Oil and Gas Sites, or a permit under §116.111 of this title (relating to General Application). Existing authorized facilities, or groups of facilities, at an OGS under this section which are not changing certified character or quantity of emissions must only meet subsections (i) and (k) of this section (protectiveness review and planned maintenance, startup, and shutdown (MSS) requirements) and otherwise retain their existing authorization. Except for planned MSS activities which must meet the requirements of subsection (i) of this section, any combination of dependent facilities with a permit under §116.111 of this title cannot also claim this section for any new facility, or changes to an existing facility, which handles (or is related to the processing of) crude oil, condensate, natural gas, or any other petroleum raw material, product, or by-product.

(3) This section does not relieve the owner or operator from complying with any other applicable provision of the Texas Health and Safety Code, Texas Water Code, rules of the Texas Commission on Environmental Quality (TCEQ), or any additional local, state, or federal laws or regulations. Emissions that exceed the limits in this section are not authorized and are violations.

(4) Emissions from upsets, emergencies, or malfunctions are not authorized by this section. This section does not regulate methane, ethane, or carbon dioxide.

(b) Definitions and Scope.

(ii) Values in Tables 2 - 5F in subsection (m) of this section may be used with linear interpolation between height and distance points. A distance of less than 50 feet or greater than 5,500 feet may not be used. Release heights may not be extrapolated beyond the limits of any table and instead the minimum or maximum height will be used. If distances and release heights are not interpolated, the next lowest height and lesser distances shall be used for determination of maximum acceptable emissions. All facilities exempted from the distance to the property line restriction in subsection (e)(2) of this section must use 50 feet as the distance to the property line for those ambient standards based on property line.

(B) Screening Modeling. A screening model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the screening modeling protocol provided by the commission are met.

(C) Dispersion Modeling. A refined dispersion model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the refined dispersion modeling protocol provided by the commission are met.

(l) The requirements in this subsection are applicable to new and modified facilities except those specified in subsection (a)(1) of this section. Any oil or gas production facility, carbon dioxide separation facility, or oil or gas pipeline facility consisting of one or more tanks, separators, dehydration units, free water knockouts, gunbarrels, heater treaters, natural gas liquids recovery units, or gas sweetening and other gas conditioning facilities, including sulfur recovery units at facilities conditioning produced gas containing less than two long tons per day of sulfur compounds as sulfur are permitted by rule, provided that the following conditions of this subsection are met. This subsection applies only to those facilities named which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids found in geologic formations beneath the earth's surface.

(1) Compressors and flares shall meet the requirements of §106.492 and §106.512 of this title (relating to Flares; and Stationary Engines and Turbines, respectively). Oil and gas facilities which are authorized under historical standard exemptions and remain unchanged maintain that authorization and the remainder of this subsection does not apply.

(2) Total emissions, including process fugitives, combustion unit stacks, separator, or other process vents, tank vents, and loading emissions from all such facilities constructed at a site under this subsection shall not exceed 25 tpy each of SO_2, all other sulfur compounds combined, or all VOCs combined; and 250 tpy each of NO_X and CO. Emissions of VOC and sulfur compounds other than SO_2 must include gas lost by equilibrium flash as well as gas lost by conventional evaporation.

(3) Total emissions of sulfur compounds, excluding sulfur oxides, from all vents shall not exceed 4.0 pounds per hour (lb/hr) and the height of each vent emitting sulfur compounds shall meet the following requirements, except in no case shall the height be less than 20 feet, where the total emission rate as H_2S, lb/hr, and minimum vent height (feet), and other values may be interpolated:

(A) 0.27 lb/hr at 20 feet;

(B) 0.60 lb/hr at 30 feet;

(C) 1.94 lb/hr at 50 feet;

(D) 3.00 lb/hr at 60 feet; and

(E) 4.00 lb/hr at 68 feet.

(4) Before operation begins, facilities handling sour gas shall be registered with the commission's Office of Permitting and Registration in Austin using Form PI-7 along with supporting documentation that all requirements of this subsection will be met. For facilities constructed under §106.353 of this title (relating to Temporary Oil and Gas Facilities), the registration is required before operation under this subsection can begin. If the facilities cannot meet this subsection, a permit under Chapter 116 of this title (relating to Control of Air Pollution by Permits for New Construction or Modification) is required prior to continuing operation of the facilities.

(m) The following tables shall be used as required in this section.

Figure: 30 TAC §106.352(m)

Table 1 Emission Impact Tables Limits and Descriptions

Topic	Description	Details
Variables	$E_{MAX\ HOURLY}$	the maximum acceptable hourly (lb/hr) emissions for a specific air contaminant
	$E_{MAX\ ANNUAL}$	the maximum acceptable annual (tpy) emissions for a specific air contaminant
	P	ambient air standard for a specific air contaminant ($\mu g/m^3$)
	ESL	current published effects screening level for a specific air contaminant ($\mu g/m^3$)

(NSPS), Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units, for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001 (as published in the December 1, 2000 issue of the *Federal Register*); or 40 CFR Part 60, Subpart DDDD, Emission Guidelines and Compliance Times for Commercial and Industrial Solid Waste Incineration Units, that Commenced Construction On or Before November 30, 1999 (as published in the December 1, 2000 issue of the *Federal Register*). If determined to be applicable, commercial and industrial solid waste incinerators must demonstrate compliance with these federal regulations, including initial stack sampling, opacity readings, reporting, and recordkeeping.

(C) State air regulations. Upon the request of the executive director, a designated representative of the commission, or a local air pollution control agency having jurisdiction over the site, compliance with §111.121 and §111.125 of this title (relating to Single-, Dual-, and Multiple-Chamber Incinerators; and Testing Requirements) must be demonstrated.

(4) Monitoring. Incinerator operators/owners shall install, calibrate, maintain, and operate a monitoring device that continuously measures and records the temperature of the exhaust gas of the incinerator, in addition to any monitoring required by an appropriate NSPS subpart.

(5) Recordkeeping. Records must be kept of the type and amount of waste charged/burned; type and amount of fuel usage, including sulfur content for fuel oil; monitoring and testing results; hours of operation; and routine maintenance of abatement systems sufficient to demonstrate each of the requirements listed previously are met. Such records must be retained for a minimum rolling two-year period and comply with §106.8 of this title (relating to Recordkeeping).

Adopted June 9, 2004 Effective June 30, 2004

§106.492. Flares.

Smokeless gas flares which meet the following conditions of this section are permitted by rule:

(1) design requirements.

(A) The flare shall be equipped with a flare tip designed to provide good mixing with air, flame stability, and a tip velocity less than 60 feet per second (ft/sec) for gases having a lower heating value less than 1,000 British thermal units per cubic foot (Btu/ft^3) or a tip velocity less than 400 ft/sec for gases having a lower heating value greater than 1,000 Btu/ft^3.

(B) The flare shall be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification of appropriate personnel when the ignition system ceases to function. A gas flare which emits no more than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides, is exempted from the immediate notification requirement, provided the emission point height meets the requirements of §106.352(4) of this title (relating to Oil and Gas Production Facilities).

(C) A flare which burns gases containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located.

(D) The heat release of a flare which emits sulfur dioxide (SO_2) or hydrogen chloride (HCl) shall be greater than or equal to the following values:

For HCl $Q = 2.73 \times 10^5 \times HCl$

For SO_2 $Q = 0.53 \times 10^5 \times SO_2$

Where Q = heat release, British thermal units per hour, based on lower heating value

HCl = HCl emission rate, lb/hr

SO_2 = SO_2 emission rate, lb/hr

(2) operational conditions.

(A) The flare shall burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. When the gas stream to be burned has a net or lower heating value of more than 200 Btu/ft^3 prior to the addition of air, it may be considered combustible.

(B) A flare which burns gases containing more than 24 ppmv of sulfur, chlorine, or compounds containing either element shall be registered with the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7 prior to construction of a new flare or prior to the use of an existing flare for the new service.

(C) Under no circumstances shall liquids be burned in the flare.

Adopted August 9, 2000 Effective September 4, 2000

§106.494. Pathological Waste Incinerators.

(a) Definitions. The following words and terms, when used in this section, shall have the following meanings, unless the context clearly indicates otherwise.

(1) **Pathological waste (as defined in 25 TAC §1.132 (relating to Definitions))**- Includes, but is not limited to:

Flare Emission Factors

The usual flare destruction efficiencies and emission factors are provided in Table 4. The high-Btu waste streams referred to in the table have a heating value greater than 1,000 Btu/scf.

Flare Destruction Efficiencies

Claims for destruction efficiencies greater than those listed in Table 4 will be considered on a case-by-case basis. The applicant may make one of the three following demonstrations to justify the higher destruction efficiency: (1) general method, (2) 99.5 percent justification, or (3) flare stack sampling.

Table 4. Flare Factors

Waste Stream	**Destruction/Removal Efficiency (DRE)**		
VOC	98 percent (generic)		
	99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide		
H_2S	98 percent		
NH_3	case by case		
CO	case by case		
Air Contaminants	**Emission Factors**		
thermal NO_x	steam-assist:	high Btu	0.0485 lb/MMBtu
		low Btu	0.068 lb/MMBtu
	other:	high Btu	0.138 lb/MMBtu
		low Btu	0.0641 lb/MMBtu
fuel NO_x	NO_x is 0.5 wt percent of inlet NH_3, other fuels case by case		
CO	steam-assist:	high Btu	0.3503 lb/MMBtu
		low Btu	0.3465 lb/MMBtu
	other:	high Btu	0.2755 lb/MMBtu
		low Btu	0.5496 lb/MMBtu
PM	none, required to be smokeless		
SO_2	100 percent S in fuel to SO_2		

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 \text{ scf}] = (3.67)$ (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2.
Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

Facility/Compound Specific Fugitive Emission Factors

Equipment/ Service	Ethylene Oxide [1]	Phosgene [2]	Butadiene [3]	Petroleum Marketing Terminal [4]	Oil and Gas Production Operations [5]				Refinery [6]
					Gas	Heavy Oil <20° API	Light Oil >20°	Water/Light Oil	
Valves					0.00992	0.0000185	0.0055	0.000216	
Gas/Vapor	0.000444	0.00000216	0.001105	0.0000287					0.059
Light Liquid	0.00055	0.00000199	0.00314	0.0000948					0.024
Heavy Liquid				0.0000948					0.00051
Pumps	0.042651	0.0000201	0.05634		0.00529	0.00113 [10]	0.02866	0.000052	
Light Liquid				0.00119					0.251
Heavy Liquid				0.00119					0.046
Flanges/Connectors	0.000555	0.00000011	0.000307		0.00086	0.00000086	0.000243	0.000006	0.00055
Gas/Vapor				0.000092604					
Light Liquid				0.00001762					
Heavy Liquid				0.0000176					
Compressors	0.000767		0.000004		0.0194	0.0000683	0.0165	0.0309	1.399
Relief Valve	0.000165	0.0000162	0.02996		0.0194	0.0000683	0.0165	0.0309	0.35
Open-ended Lines [7]	0.001078	0.00000007	0.00012		0.00441	0.000309	0.00309	0.00055	0.0051
Sampling	0.000088		0.00012						0.033
Connectors					0.00044	0.0000165	0.000463	0.000243	
Other [9]					0.0194	0.0000683	0.0165	0.0309	
Gas/Vapor				0.000265					
Light/Heavy Liquid				0.000287					
Process Drains					0.0194	0.0000683	0.0165	0.0309	0.07

Table Notes: All factors are in units of (lb/hr)/component.

1. Monitoring must occur at a leak definition of 500 ppmv. No additional control credit can be applied to these factors. Emission factors are from EOIC Fugitive Emission Study, Summer 1988.

2. Monitoring must occur at a leak definition of 50 ppmv. No additional control credit can be applied to these factors. Emission factors are from Phosgene Panel Study, Summer 1988.

3. Monitoring must occur at a leak definition of 100 ppmv. No additional control credit can be applied to these factors. Emission factors are from Randall, J. L., et al., Radian Corporation. Fugitive Emissions from the 1,3-butadiene Production Industry: A Field Study. Final Report. Prepared for the 1,3-Butadiene Panel of the Chemical Manufacturers Association. April 1989.

4. Control credit is included in the factor; no additional control credit can be applied to these factors. Monthly AVO inspection required.

5. Factors give the total organic compound emission rate. Multiply by the weight percent of non-methane, non-ethane organics to get the VOC emission rate.

6. Factors are taken from EPA Document EPA-453/R-95-017, November 1995, Page 2-13.

7. The 28 Series quarterly LDAR programs require open-ended lines to equipped with a cap, blind flange, plug, or a second valve. If so equipped, open-ended lines may be given a 100% control credit.

8. Emission factor for Sampling Connections is in terms of pounds per hour per sample taken.

9. For Petroleum Marketing Terminals"Other" includes any component excluding fittings, pumps, and valves. For Oil and Gas Production Operations, "Other" includes diaphragms, dump arms, hatches, instruments, meters, polished rods, and vents.

10. No Heavy Oil - Pump factor was derived during the API study. The factor is the SOCMI without C_2 Heavy Liquid - Pump factor with a 93% reduction credit for the physical inspection.

Tank Truck Loading of Crude Oil or Condensate

Scope: Tank Truck Loading activities at loading terminals

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil or condensate is transported from oil and gas sites to a refinery or other refining operations by tankers, barges, rail tank cars, tank trucks, and pipelines.

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations (for marine loading please review Marine Loading of Crude Oil and Condensate Guidance Document). Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

Tank truck loading operations can be divided into three general categories: A) atmospheric trucks, B) pressure trucks used in atmospheric service, and C) pressure trucks. The type of connection that is used in the loading procedure will be considered to determine the collection efficiency. "Quick connects" are clamp type connections that are not bolted or flanged. "Quick connects" can be used with atmospheric trucks. Hard-piped connections are bolted or flanged to the receiving vessel. Hard-piped connections should be used with pressure trucks to achieve its maximum collection efficiency. Atmospheric trucks must be leak checked according to NSPS Subpart XX to achieve its maximum collection efficiency.

Tank Truck Loading Authorizations

All stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water that satisfy the general conditions of Title 30, Texas Administrative Code (30 TAC), Section 106.4, and the specific conditions of 30 TAC Section 106.352 are permitted by rule. The commission also has available rule language in an easy-to-read format for the permit by rule.

For all new projects and dependent facilities not located in the Barnett Shale counties, the current 106.352 subsection (l) is applicable, which contains the previous requirements of 106.352.

For projects located in one of the Barnett Shale counties which are constructed or modified on or after April 1, 2011 subsections (a)-(k) apply.

Other permit by rules which may be used for tank truck loading but are not commonly seen are 106.261, 106.262, 106.472, and 106.473.

If a site does not qualify for a PBR, it may be authorized by a standard permit. Sites constructed prior to April 1, 2011 may be authorized using the Oil and Gas Standard Permit (30 TAC 116.620, effective January 11, 2000). For sites in one of the Barnett Shale counties constructed or modified on or after April 1, 2011, the site is subject to the requirements of the Air Quality Standard Permit for Oil and Gas Handling and Production Facilities.

Emission Calculations

Loading calculations are listed in AP-42, Chapter 5, Section 5.2: Transportation and Marketing of Petroleum Liquids.

Submerged tank truck loading is the minimum level of control required. The two types of submerge loading are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. The loading calculation requires the use of a Saturation Factor (S factor) listed in Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

<u>Submerged loading: dedicated normal service, S factor = 0.6</u>

The S factor of 0.6 should be used if the tank truck is in "dedicated normal service". Dedicated normal service means the tank truck is used to transport only one product or products with similar characteristics (petroleum products with similar API gravity, molecular weight, vapor pressure).

<u>Submerged Loading: dedicated vapor balance, S factor = 1.0</u>

The S factor of 1.0 should be used if the loading vapors are returned back to the tank truck when it is unloaded to a storage tank or other vessel.

Emissions from loading petroleum liquid can be estimated using the following expression:

Where:

$$L_L = 12.46 \frac{SPM}{T}$$

- LL= loading loss, pounds per 1000 gallons (lb/103 gal) of liquid loaded
- S = a saturation factor (see Table 5.2-1)

- P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
- M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
- T = temperature of bulk liquid loaded, °R (°F + 460)

Emissions are broken down into short-term emissions (lb/hr) and annual emissions (tons/year). Short-term emissions should be estimated by using the maximum expected vapor pressure and temperature of the compound being loaded and the maximum expected pumping rate being used to fill the container (loading tank truck). Annual emissions should be estimated by using the average annual temperature and corresponding vapor pressure of the compound and the expected annual throughput of the compound.

Capture/Collection techniques and efficiency

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment.

Please note,not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 98.7 percent for tanker trucks passing an annual leak test per EPA standards. A collection efficiency of 70 percent should be assumed for trucks which are not leak tested.

- 70% capture/collection efficiency if not leak tested
- 98.7% capture/collection efficiency if leak tested based on EPA standards (NSPS Subpart XX)
- 100% capture/collection efficiency if a blower system is installed which will produce a vacuum in the tank truck during all loading operations. A pressure/vacuum gauge shall be installed on the suction side of the loading rack blower system adjacent to the truck being loaded to verify a vacuum in that vessel. Loading shall not occur unless there is a vacuum of at least 1.5 inch water column being maintained by the vacuum-assist vapor collection system when loading trucks. The vacuum shall be recorded every 15 minutes during loading.

Uncollected Loading Emissions

Uncollected loading emissions are referred to as loading fugitives and are listed as a separate emission point or source. Uncollected loading emissions (LLF) can be estimated using the following expression:

$$L_{LF} = (L_L) \frac{(1 - \text{Collection Efficiency})}{100}$$

Control techniques and control efficiencies

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in the loading loss equation (LL) by an overall reduction efficiency term:

$$\text{Emissions} = (L_L)\left(\frac{\text{Collection Efficiency}}{100}\right)\left(1 - \frac{\text{Collection Efficiency}}{100}\right)$$

- Flares – Flares must meet 40 CFR 60.18 requirements of minimum heating value of waste gas and a maximum flare tip velocity. Flares can have a control efficiency of 98% or 99% for the following compounds: methanol, ethanol, propanol, ethylene oxide, and propylene oxide. The agency highly encourages the consideration of variable speed blowers when a control efficiency of > 98% is claimed for a steam – assisted flare to reduce over steaming of the flare which could affect the control efficiency.
- Thermal oxidizers – must be designed for the variability of the waste gas stream and basic monitoring which consists of thermocouple or infrared monitor that indicates the device is working. Control efficiencies range from 95% - <99%.
- Carbon Systems – Can claim up to a 98% control efficiency. The carbon system must have an alarm system that will prevent break through.
- Vapor Recovery Units (VRU) – Can claim up to 100% control. Designed systems claiming 100% control must submit the requirements found in the Vapor Recovery Unit Capture/Control Guidance.

Note: Loading cannot occur while the control system is off-line.

Vapor balancing is NOT a form of control; it is only a capture technique.

SITE DATA

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Representative Analyses:
Etheridge B1
and Laird B1

Stream Compositions:

	Stream 1		Stream 2		Stream 3		Stream 4	
	Inlet Gas		Flare Assist Gas		LP Condensate		Produced Water	
Component	mole %	wgt. %	mole %	wgt. %	mole %	wgt. %	mole %	wgt %
Nitrogen	0.254%	0.301%	0.164%	0.202%	0.048%	0.012%	0.000%	0.000%
Carbon Dioxide	2.372%	4.420%	2.163%	4.185%	0.125%	0.049%	0.001%	0.002%
Water	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	99.000%	94.121%
Hydrogen Sulfide	0.0200%	0.029%	0.020%	0.030%	0.000%	0.000%	0.000%	0.000%
Methane	70.652%	47.988%	75.685%	53.374%	2.101%	0.302%	0.021%	0.018%
Ethane	14.029%	17.860%	11.765%	15.551%	2.081%	0.561%	0.021%	0.033%
Propane	6.979%	13.029%	4.689%	9.089%	3.619%	1.431%	0.036%	0.084%
I-Butane	1.061%	2.611%	0.899%	2.297%	1.260%	0.657%	0.013%	0.040%
N-Butane	2.235%	5.500%	1.663%	4.249%	3.992%	2.081%	0.040%	0.123%
I-Pentane	0.661%	2.019%	0.652%	2.068%	2.779%	1.798%	0.028%	0.107%
N-Pentane	0.665%	2.031%	0.623%	1.976%	3.830%	2.478%	0.038%	0.145%
Cyclopentane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
n-Hexane	0.218%	0.795%	0.279%	1.057%	3.069%	2.372%	0.031%	0.141%
Cyclohexane	0.088%	0.321%	0.137%	0.519%	1.076%	0.831%	0.011%	0.050%
Other Hexanes	0.401%	1.463%	0.517%	1.958%	4.278%	3.306%	0.043%	0.196%
Heptanes	0.193%	0.819%	0.347%	1.528%	7.783%	6.993%	0.078%	0.412%
Octanes	0.044%	0.213%	0.109%	0.547%	6.618%	6.779%	0.066%	0.398%
Nonanes	0.025%	0.136%	0.058%	0.327%	5.967%	6.863%	0.060%	0.406%
Decanes Plus	0.007%	0.042%	0.014%	0.088%	46.045%	58.753%	0.460%	3.454%
Benzene	0.027%	0.089%	0.034%	0.117%	0.426%	0.298%	0.004%	0.016%
Toluene	0.062%	0.242%	0.132%	0.535%	1.824%	1.507%	0.018%	0.087%
Ethylbenzene	0.004%	0.018%	0.006%	0.028%	0.443%	0.422%	0.004%	0.022%
Xylene	0.023%	0.103%	0.065%	0.303%	2.634%	2.508%	0.026%	0.146%
Totals	100.02%	100.00%	100.02%	100.00%	99.998%	100.00%	99.999%	100.00%
Totals (C3+)		29.43%		26.69%		99.08%		5.83%
VOC max (%)		30.00%		30.00%		100.00%		10.00%
Higher Heating Value (Btu/scf)	1358		1315					
Lower Heating Value (Btu/scf)	1335		1292					
Specific Gravity	0.8185				0.7873			

SGS LABORATORY REFERENCE NUMBER : **6889-250891**

Conoco Phillips

ID:	**Etheridge B1**	LINE PRESSURE:	**81 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**84 F**
METER:	**Low Pressure Separator**	CYLINDER NUMBER:	**0036**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

Physical Properties per GPA 2145-09 Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.254	0.301	
CARBON DIOXIDE	2.372	4.421	
METHANE	70.652	47.999	
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
HEXANES	0.566	2.065	0.234
HEPTANES PLUS	0.526	2.152	0.213
	100.000	100.000	7.669

BTU	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 14.696 PSIA (DRY)	1351.7	1357.6
BTU @ 14.696 PSIA (SAT.)	1328.1	1334.5
Specific Gravity	0.8153	0.8185
Compressibility (Z)	0.9957	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	7.456
Propane & Heavier	3.697
Butane & Heavier	1.771
Pentane & Heavier	0.717
Total 26 psi Reid V.P. Gasoline GPM	1.391

Secondary BTU Psia Base	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 15.025 PSIA (DRY)	1381.9	1388.1
BTU @ 15.025 PSIA (SAT.)	1357.8	1364.5

Compressibility (Z) at 15.025 = 0.9956

Remarks:
Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6889-250891**

COMPANY: **Conoco Phillips** **SAMPLE DATE:** **########**
AREA / FIELD: **Eagleford**
LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.254	0.301	0.028
CARBON DIOXIDE	2.372	4.421	0.406
METHANE	70.652	47.999	11.999
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
2,2-Dimethylbutane	0.013	0.047	0.005
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.206	0.752	0.086
3-Methylpentane	0.129	0.470	0.053
n-Hexane	0.218	0.796	0.090
2,2-Dimethylpentane	0.004	0.017	0.002
Methylcyclopentane	0.053	0.189	0.019
2,4-Dimethylpentane	0.000	0.000	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.027	0.089	0.008
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.088	0.314	0.030
2-Methylhexane	0.008	0.034	0.004
2,3-Dimethylpentane	0.039	0.166	0.018
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.007	0.030	0.003
l,t-3-Dimethylcyclopentane	0.004	0.017	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.006	0.025	0.002
l,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.073	0.310	0.034
Methylcyclohexane	0.051	0.212	0.021
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.001	0.005	0.000
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.002	0.010	0.001
Ethylcyclopentane	0.001	0.004	0.000
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.062	0.242	0.021
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.012	0.058	0.006
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.001	0.005	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6889-250891**

COMPANY: Conoco Phillips **SAMPLE DATE: ########**
AREA / FIELD: Eagleford
LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
l,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.008	0.038	0.004
n-Octane	0.024	0.116	0.012
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.002	0.010	0.001
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.001	0.005	0.000
Isopropylcyclopentane	0.001	0.005	0.000
Dimethylheptanes & Trimethylhexanes	0.003	0.016	0.002
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.002	0.011	0.001
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.004	0.018	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.007	0.031	0.003
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.001	0.005	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.016	0.072	0.006
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.007	0.038	0.004
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
Isopropylcyclohexane	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.001	0.005	0.000
N-Propylcyclohexane	0.001	0.005	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.001	0.006	0.001
n-Propylbenzene	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.002	0.012	0.001
	100.000	100.000	20.102

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6889-250891**

COMPANY: **Conoco Phillips** **SAMPLE DATE:** **########**
AREA / FIELD: **Eagleford**
LEASE:

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	23.613	96.508
Relative Density	0.3730	0.7611
Liquid Density (lbs/gal Absolute Density)	3.110	6.345
Liquid Density (lbs/gal Weight in Air)	3.107	6.339
Cu.Ft./Vapor / Gal. @ 14.696	49.981	24.949
Vapor Pressure @ 100° F	3660.220	0.980
API Gravity at 60° F	247.9	54.4
BTU / LB	21723	10231
BTU / GAL.	67539	60392
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1351.7	5098.4
Specific Gravity as a Vapor @ 14.696	0.8153	1.6056

Heavy End Grouping Breakdown

HEXANES	C6	0.566
HEPTANES	C7	0.309
OCTANES	C8	0.162
NONANES	C9	0.046
DECANES+	C10	0.009
	Total	1.092 **Mol%**

BTEX BREAKDOWN

	Mol%	**WT.%**
BENZENE	0.027	0.089
TOLUENE	0.062	0.242
ETHYLBENZENE	0.004	0.018
XYLENES	0.023	0.103
Total BTEX	**0.116**	**0.452**

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6889-250891**

Conoco Phillips

ID:	**Etheridge B1**	LINE PRESSURE:	**81 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**84 F**
METER:	**Low Pressure Separator**	CYLINDER NUMBER:	**0036**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

Physical Properties per GPA 2145-09 — Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.254	0.301	
CARBON DIOXIDE	2.372	4.421	
METHANE	70.652	47.999	
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
HEXANE	0.566	2.065	0.234
HEPTANE	0.309	1.191	0.122
OCTANE	0.162	0.690	0.066
NONANE	0.046	0.222	0.021
DECANE+	0.009	0.049	0.004
	100.000	100.000	7.669

BTU	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 14.696 PSIA (DRY)	1351.7	1357.6
BTU @ 14.696 PSIA (SAT.)	1328.1	1334.5
Specific Gravity	0.8153	0.8185
Compressibility (Z)	0.9957	

Gasoline Content (Gallons Per Thousand - GPM)	
Ethane & Heavier	7.456
Propane & Heavier	3.697
Butane & Heavier	1.771
Pentane & Heavier	0.717
Total 26 psi Reid V.P. Gasoline GPM	1.391

Secondary BTU Psia Base	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 15.025 PSIA (DRY)	1381.9	1388.1
BTU @ 15.025 PSIA (SAT.)	1357.8	1364.5

Compressibility (Z) at 15.025 = 0.9956

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

Remarks:

SGS LABORATORY

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford

Sample Container	Sample Description	Sample Point	Sample Time	Sample Matrix	RVP by D5191	Sample Pressue, psi	Sample Temp, F
Cylinder Type/No.or Bottle	Field/Locations.Well		Date, hours				
Station 74139 (10)	Etheridge B1	LP Separator before Dump Valve	12-20-2011 @ 11:00 AM	**Condensate**	**9.85 psi**	84	85

Chromatographic Extended Analysis - Summation Report			
Component	**Mol%**	**Liq Vol%**	**Wt%**
Nitrogen	0.048	0.008	0.008
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane	1.260	0.621	0.444
N-Butane	3.992	1.895	1.406
2,2 Dimethylpropane	0.021	0.012	0.009
IsoPentane	2.779	1.530	1.215
n-Pentane	3.809	2.079	1.666
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.181	0.153
2 Methylpentane	1.842	1.151	0.962
3 Methylpentane	1.088	0.669	0.566
n-Hexane	3.069	1.900	1.603
Heptanes Plus	73.804	87.004	90.346
Total	100.000	100.000	100.000

Characteristics of Heptanes Plus		
Specific Gravity	0.8175	(Water = 1)
API Gravity	41.59	@60 F
Molecular Weight	202.0	
Vapor Volume	12.85	CF/Gal
Weight	6.81	Lbs/Gal

Characteristics of Total Sample		
Specific Gravity	0.7873	(Water = 1)
API Gravity	48.24	@60 F
Molecular Weight	165.0	
Vapor Volume	15.14	CF/Gal
Weight	6.56	Lbs/Gal

Total Extended Report			
Component	**Mol%**	**Liq Vol%**	**Wt%**
Nitrogen	0.048	0.008	0.006
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane	1.260	0.621	0.444
N-Butane	3.992	1.895	1.406
2,2 Dimethylpropane	0.021	0.012	0.009
IsoPentane	2.779	1.530	1.215
n-Pentane	3.809	2.079	1.666
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.181	0.153
2 Methylpentane	1.842	1.151	0.962
3 Methylpentane	1.088	0.669	0.568
n-Hexane	3.069	1.900	1.603
Methylcyclopentane	0.986	0.526	0.503
Benzene	0.426	0.180	0.202
Cyclohexame	1.076	0.551	0.549
2-Methylhexane	1.284	0.899	0.780
3-Methylhexane	1.053	0.728	0.640
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.801	0.541	0.482
n-Heptane	2.776	1.928	1.686
Methy cyclohexane	1.869	1.131	1.112
Toluene	1.824	0.920	1.018
Other C-8's	4.248	3.088	2.837
n-Octane	2.370	1.828	1.641
E-Benzene	0.443	0.258	0.285
M & P Xylenes	1.938	1.132	1.247
O-Xylene	0.696	0.398	0.448
Other C-9's	3.963	3.218	3.032
n-Nonane	2.004	1.698	1.557
Other C-10's	5.024	4.483	4.301
n Decane	1.515	1.400	1.306
Undecanes (11)	5.324	4.874	4.743
Dodecanes (12)	4.010	3.965	3.912
Tridecanes (13)	3.769	3.996	3.997
Tetradecanes (14)	3.226	3.663	3.714
Pentadecanes (15)	2.694	3.278	3.363
Hexadecanes (16)	2.180	2.835	2.934
Heptadecanes (17)	1.927	2.649	2.767
Octadecanes (18)	1.724	2.495	2.622
Nonadecanes (19)	1.600	2.413	2.551
Eicosanes (20)	1.271	1.992	2.118
Heneicosanes (21)	1.058	1.745	1.866
Doccsanes (22)	0.967	1.662	1.788
Triccsanes (23)	0.757	1.349	1.459
Tetracosanes (24)	0.692	1.278	1.389
Pentacosanes (25)	0.617	1.182	1.290
Hexacosanes (26)	0.452	0.898	0.984
Heptacosanes (27)	0.493	1.015	1.118
Octacosanes (28)	0.424	0.903	0.998
Nonacosanes (29)	0.360	0.791	0.877
Triacontanes (30)	0.274	0.622	0.692
Hentriacontanes Plus (31+)	5.687	18.494	21.541
Total	100.000	100.000	100.000

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

Conoco Phillips

ID:	**Laird B1**	LINE PRESSURE:	**1060 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**112 F**
METER:	**High Pressure Separator**	CYLINDER NUMBER:	**0110**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

Physical Properties per GPA 2145-09 Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANES	0.733	2.778	0.302
HEPTANES PLUS	0.964	4.182	0.396
	100.000	100.000	6.428

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

Gasoline Content (Gallons Per Thousand - GPM)	
Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psia Base	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9
Compressibility (Z) at 15.025 =	0.9960	

Remarks:
Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: Conoco Phillips **SAMPLE DATE: ########**
AREA / FIELD: Eagleford
LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	0.018
CARBON DIOXIDE	2.163	4.187	0.370
METHANE	75.685	53.403	12.848
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
2,2-Dimethylbutane	0.025	0.093	0.010
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.248	0.940	0.103
3-Methylpentane	0.182	0.688	0.074
n-Hexane	0.279	1.057	0.115
2,2-Dimethylpentane	0.009	0.040	0.004
Methylcyclopentane	0.062	0.229	0.022
2,4-Dimethylpentane	0.001	0.004	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.034	0.117	0.010
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.137	0.507	0.047
2-Methylhexane	0.012	0.053	0.006
2,3-Dimethylpentane	0.071	0.313	0.032
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.010	0.044	0.005
l,t-3-Dimethylcyclopentane	0.006	0.026	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.009	0.039	0.004
l,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.135	0.595	0.062
Methylcyclohexane	0.092	0.397	0.037
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.003	0.015	0.001
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.005	0.025	0.003
Ethylcyclopentane	0.002	0.009	0.001
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.132	0.535	0.044
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.033	0.166	0.017
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.002	0.010	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: Conoco Phillips **SAMPLE DATE: ########**
AREA / FIELD: Eagleford
LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
l,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.017	0.084	0.008
n-Octane	0.057	0.286	0.029
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.004	0.020	0.002
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.002	0.010	0.001
Isopropylcyclopentane	0.003	0.015	0.001
Dimethylheptanes & Trimethylhexanes	0.006	0.033	0.003
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.007	0.039	0.004
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.006	0.028	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.019	0.089	0.007
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.002	0.011	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.046	0.215	0.018
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.020	0.113	0.011
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.001	0.006	0.001
Isopropylcyclohexane	0.002	0.011	0.001
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.002	0.010	0.001
N-Propylcyclohexane	0.001	0.006	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.003	0.019	0.002
n-Propylbenzene	0.003	0.016	0.001
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.004	0.025	0.002
	100.000	100.000	19.664

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: **Conoco Phillips** **SAMPLE DATE:** ########

AREA / FIELD: **Eagleford**

LEASE:

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	22.736	98.624
Relative Density	0.3670	0.7618
Liquid Density (lbs/gal Absolute Density)	3.060	6.351
Liquid Density (lbs/gal Weight in Air)	3.057	6.345
Cu.Ft./Vapor / Gal. @ 14.696	51.074	24.437
Vapor Pressure @ 100° F	3889.010	1.010
API Gravity at 60° F	254.1	54.2
BTU / LB	21868	12034
BTU / GAL.	66890	72131
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1310.2	5205.2
Specific Gravity as a Vapor @ 14.696	0.7850	1.9341

Heavy End Grouping Breakdown

HEXANES	C6	0.733
HEPTANES	C7	0.486
OCTANES	C8	0.343
NONANES	C9	0.117
DECANES+	C10	0.018
	Total	1.697 **Mol%**

BTEX BREAKDOWN

	Mol%	WT.%
BENZENE	0.034	0.117
TOLUENE	0.132	0.535
ETHYLBENZENE	0.006	0.028
XYLENES	0.065	0.304
Total BTEX	**0.237**	**0.984**

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

Conoco Phillips

ID:	**Laird B1**	LINE PRESSURE:	**1060 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**112 F**
METER:	**High Pressure Separator**	CYLINDER NUMBER:	**0110**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

Physical Properties per GPA 2145-09 Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANE	0.733	2.778	0.302
HEPTANE	0.486	1.967	0.194
OCTANE	0.343	1.527	0.141
NONANE	0.117	0.584	0.051
DECANE+	0.018	0.104	0.010
	100.000	100.000	6.428

BTU	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

<u>Gasoline Content (Gallons Per Thousand - GPM)</u>

Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psla Base	**Vol. IDEAL Gas Fuel**	**Vol. Real Gas Fuel**
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9

Compressibility (Z) at 15.025 = 0.9960

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

Remarks:

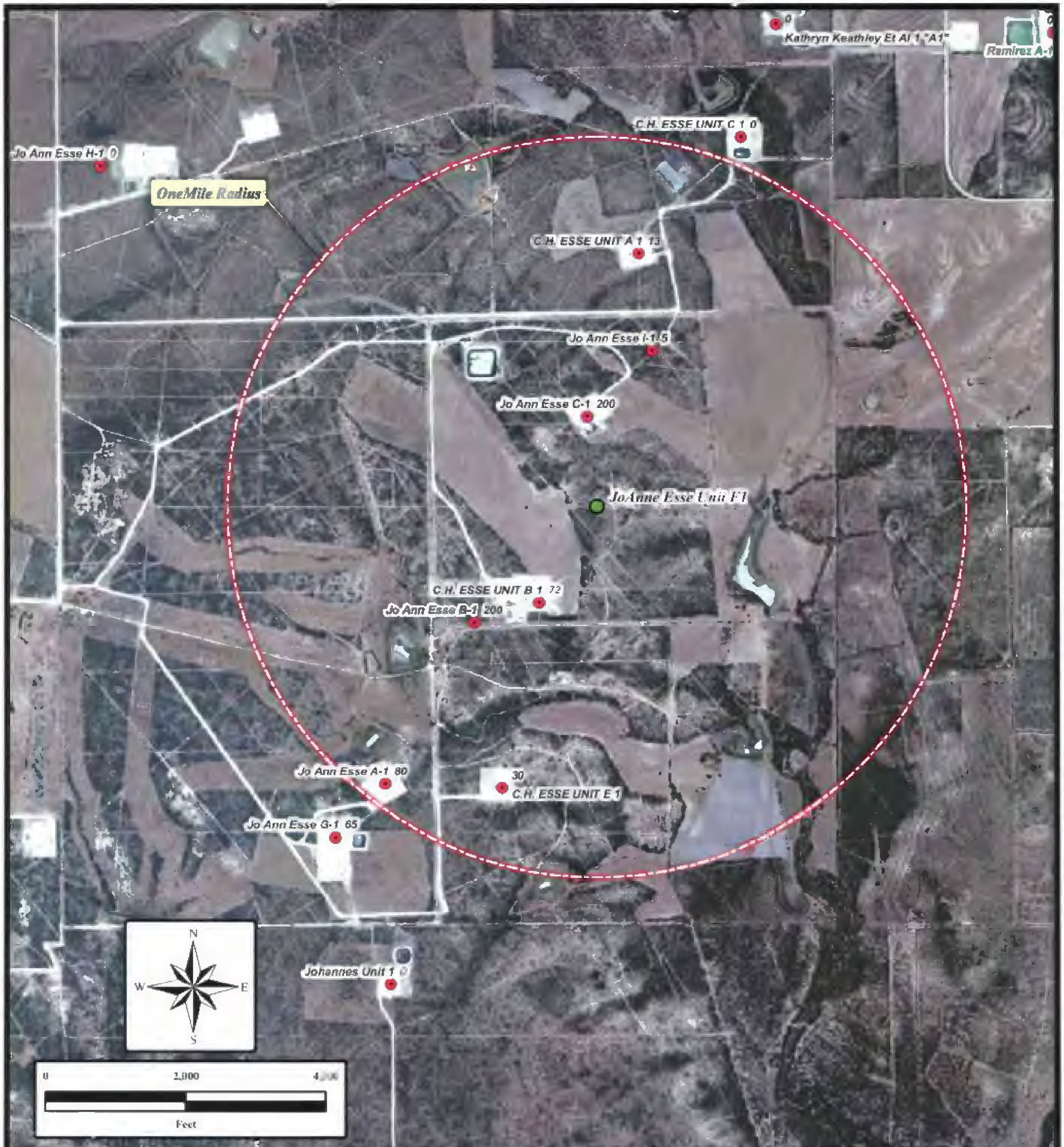

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FIGURE 5-1
H2S REPRESENTATIVE METER READING
Burlington Resources Oil & Gas Company LP
Permit by Rule Registration
JoAnne Esse Unit F1
TITAN Project No. 84800507-71.051
June 2012

from USGS Quadrangle Peggy, Texas
Ground Condition Depicted March 2011
Digital Data Courtesy of ESRI Online Datasets